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Final Report

NASA CR-

151654

February 1978

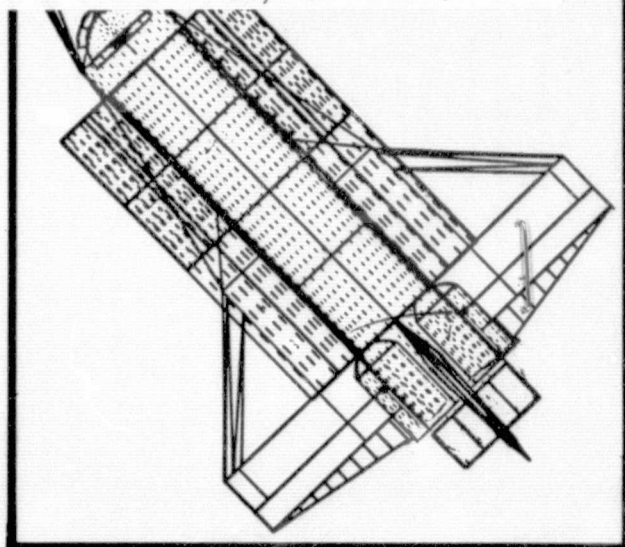
Orbiter/Payload Contamination Control Assessment Support

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CONTAMINATION CONTROL ASSESSMENT SUPPORT
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February 1, 1978

Technical Report

ORBITER/PAYLOAD CONTAMINATION CONTROL
ASSISTMENT SUPPORT

FINAL REPORT

Contract NAS9-14767
Exhibit C

Author

R. O. Rantanen
D. A. Strange
M. A. Hetrick

Prepared for

Lyndon B. Johnson Space Center
Houston, Texas 77058

MARTIN MARIETTA AEROSPACE
Denver Division
P. O. Box 179
Denver, Colorado 80201

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1.0 SCOPE

1.1 Purpose

The purpose of this report is to present the results achieved in performing the Orbiter/Payload Contamination Control Assessment Support study. The intent of this activity was to include payload bay filters as Orbiter sources, begin the development of a mission profile model to simulate missions, develop a temperature conversion program between thermal math model node structure and the contamination model and develop a plot capability for various contamination parameters and time intervals. The major source changes were to be reflected in the Users Manual update for the Shuttle/Payload Contamination Evaluation (SPACE) program delivered previously under Exhibit B of this contract.

1.2 Scope

This report describes the development and integration of payload bay liner filters into the existing SPACE program and the development of an initial mission profile model. As part of the mission profile model, a thermal conversion program, a temperature cycling routine, a flexible plot routine and a mission simulation of OFT-3 are presented.

1.3 Summary

Additional sources and external modifications to the SPACE program have been established. The additional sources include a total of 16 filters in the payload bay liner. Eight of these are between the payload bay volume and the bulkhead and the other eight are positioned at the locations where the overboard vents exist. Viewfactors between the filters and the points along 17 lines-of-sight, that currently exist in the SPACE program, were calculated and integrated into the SPACE program.

The thermal conversion program was designed to access current thermal program output tapes at JSC and convert the thermal node structure to the contamination node structure in SPACE.

A mission profile of OFT 3 was simulated to understand ramifications of simulation modeling and determine desired methods of data acquisition and handling.

The plot routine was developed primarily to plot molecular number column density as a function of time but has been generalized to accept almost any parameter derived from the SPACE program.

2.0 APPLICABLE DOCUMENTS

2.1 Program Documents

The following documents form a part of this report in the extent that they were used for related program information relevant to this study.

PROGRAM DOCUMENTS

MCR-77-107	"Orbiter/Payload Contamination Control Assessment Support" NAS9-14767, Exhibit B, April 29, 1977, Martin Marietta Aerospace, Denver Division
MCR-77-106	"Shuttle/Payload Contamination Evaluation Program" User's Manual NAS9-14767, Exhibit B, April 28, 1977, Martin Marietta Aerospace, Denver Division
JSC 10982	"OFT Payload Planning Status", Rev D November 1, 1976

3.0 STUDY RESULTS

3.1 Thermal Mapper Conversion Program

In order to determine the necessary surface temperatures for contamination analysis using the SPACE program, it is required to relate thermal data as derived from thermal model nodes to those of the SPACE contamination model. This capability is important because of the many temperature profiles that will be experienced by the Shuttle Orbiter for the various missions to be flown. The nodal breakdown is necessarily quite different for the two disciplines so that where detail was required in one model it was not necessarily so for the other model. The result was an overlaying of several nodes or parts of nodes of one model by a single node of the other.

Three thermal models were used in the conversion program. These were the forward and aft fuselage models developed by Rockwell International and the midsection model developed by JSC. Because of the lack of nodal detail, important to contamination in the JSC wing model, only the forward wing section (forward of X₀ station 1307) was correlated with the JSC model. The aft wing section was correlated with the Rockwell aft wing model and will use Rockwell aft wing temperatures for analysis operations.

The process of correlation of the applicable models involved superimposing one over the other and determining the percentage of contamination model nodes covered by specific thermal model nodes. In some cases, the divisions and relationships were evident and could be determined readily by a side by side visual inspection. In other cases, it was necessary to redraw the nodal configuration of one model directly on the other. This latter

case was especially true of the forward fuselage models where the Rockwell model involved many small nodes.

The program developed to convert the temperatures consists of five subroutines. The flow of this program and a description of each subroutine is as follows.

MAIN - This is the driver routine. It requires four input tapes and creates one output tape. Unit 11 (tape form) is used to store the Rockwell forward model SINDA tape, unit 12 is the 390 node JSC midsection model SINDA tape and unit 13 is the aft model SINDA tape. Unit 14 is the actual map of contamination model nodes onto the combination of the three thermal models. This subroutine reads in unit 14 and then calls subroutine BLKT.

BLKT - This is a block data subroutine that has the node names used by the contamination model for each thermal model. This optimizes the core and time problem resulting from the fact that the contamination model will use approximately 100 pieces of information on a record containing 1800 pieces of information. This data is then used by subroutine SORT.

SORT - This routine gathers in the entire (up to 2000 words) thermal record for the model of interest (forward, mid and aft) and locates the address of each thermal node needed (defined in BLKT). This address is saved and is used as an index for all following records which contain the actual temperatures. The control of the program returns to the main program which loops over unit 14 and collects the partial temperatures for each contamination node in the present SPACE model. In this loop, subroutine SHORT is called.

SHORT - This subroutine uses the index defined in SORT to fill a short array with temperatures off of the SINDA records. The temperatures on the SINDA tapes are degrees fahrenheit and must be converted to centigrade for the contamination model. To do this, function CENTI is called.

CENTI - This function converts degrees F to degrees C.

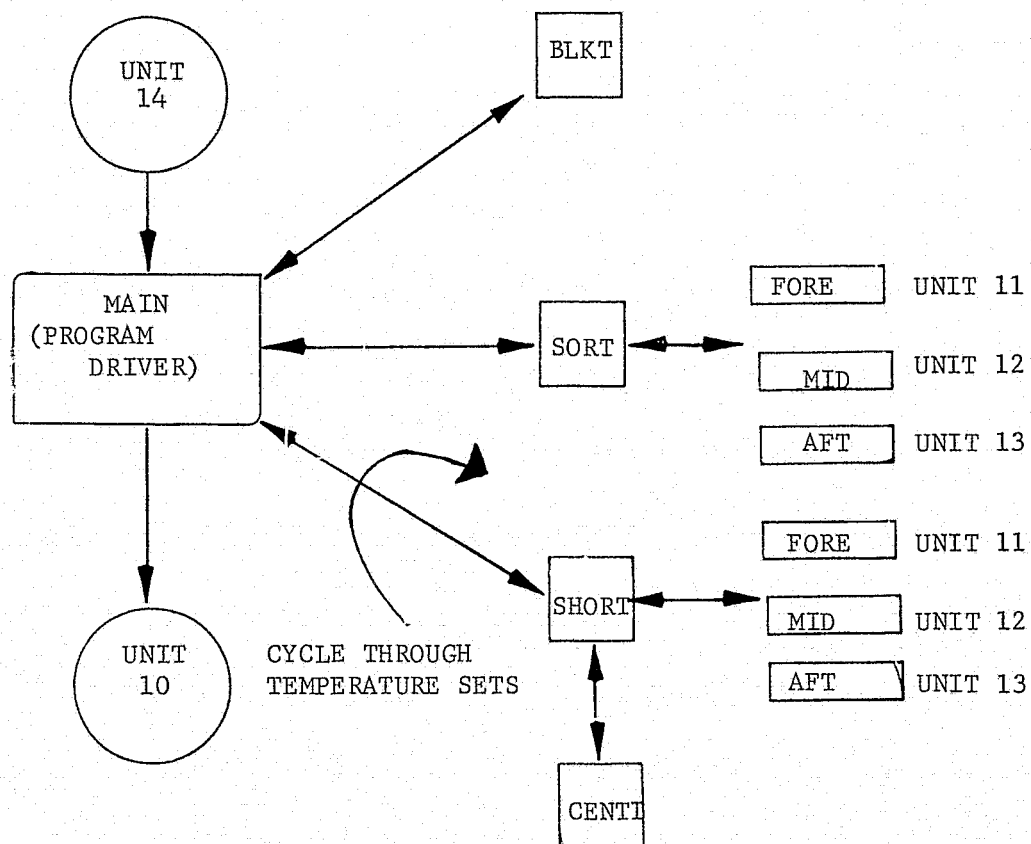
Control returns to the subroutine MAIN. The cycling is continued until 7 temperatures are stored for each contamination model node. An output tape (unit 10) is then formatted and written. The format can be directly input into the SPACE model and stored in ATCODE for use.

The user of the conversion program may select any or all of the thermal models and may turn on a DEBUG command for listing of extensive intermediate calculations. The number of sets of temperatures (up to seven) can be chosen and must match the number of sets of temperatures on the SINDA tapes. For example, if only maximum and minimum temperatures are on the SINDA tapes then only two temperature sets can be assigned to contamination model nodes.

Figure 1 shows the flow of the Thermal Mapper program as defined above.

A listing of unit 14 data and the MAIN driver program is included as Appendix A.

The input to the Thermal Mapper program consists of 2 name-list input cards. The first card has the word name \$TIN beginning in column 2 and the second card has the word name sequence FORE = .T., MID = .T., AFT = .T., DEBUG = .T., NUM = 7 \$ beginning anywhere after column 2. The user may negate any



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Figure 1 Flow Chart of Thermal Mapper Program

portion by putting .F. in place of .T.. The NUM = 7 pertains to the number of temperatures for each surface or equivalently the number of temperature profiles on the SINDA tape.

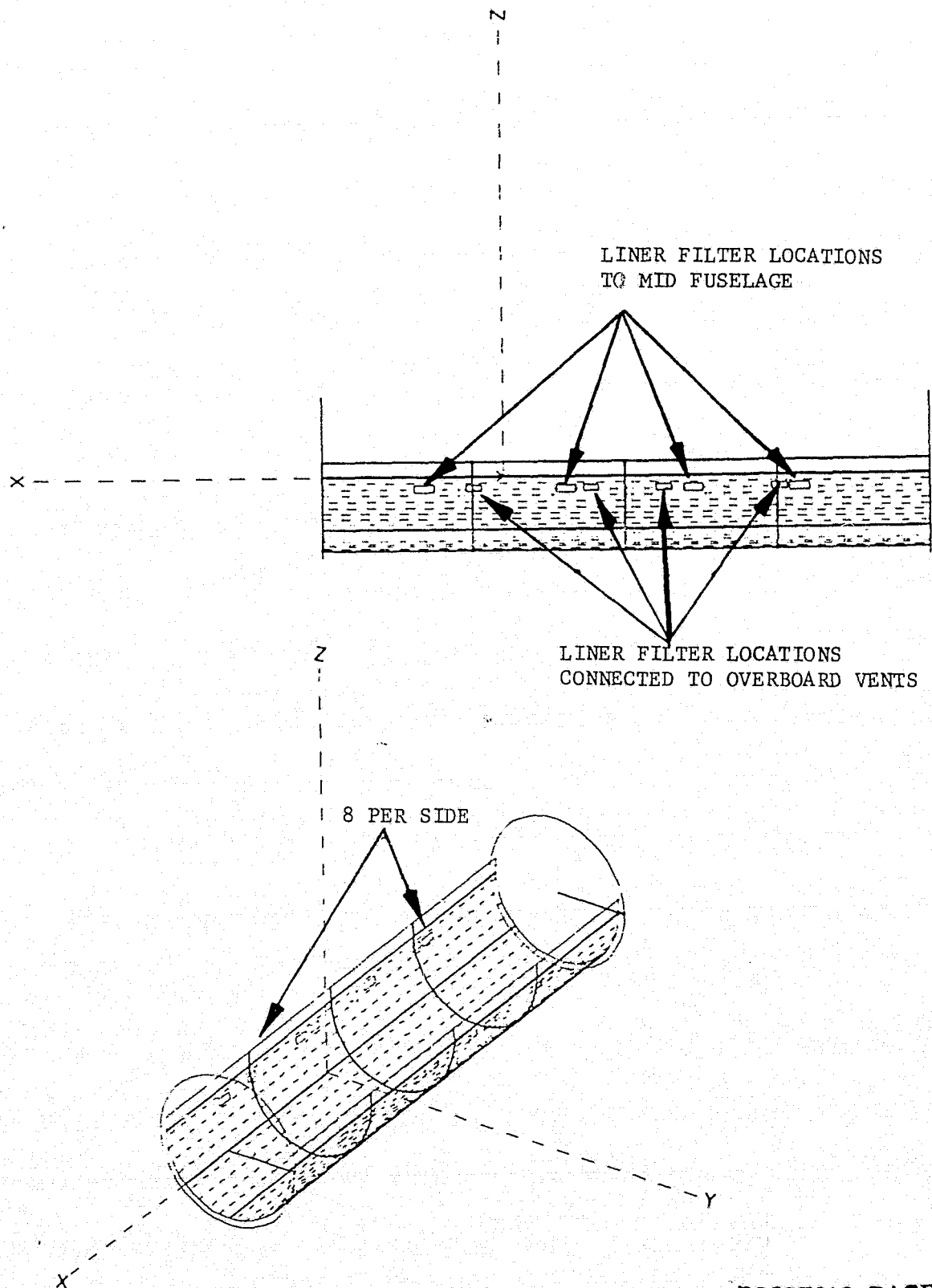
3.2 Payload Bay Filter Sources

A total of 16 liner filters have been input to the SPACE program. Figure 2 shows graphic displays of the filter locations. There are a total of 8 filters to a side. Four of these were input from data supplied by NASA JSC and represent the filters between the payload bay and the mid fuselage region between the bay and the bulkhead. The others are connected to openings overboard and were taken from Rockwell drawings "Orbiter Compartments Baseline, Drawing Number VC70-000003" and "Orbiter Leakage Allowables, Drawing VC70-000005". These have been developed as individual sources for the SPACE program. The payload bay liner filters and those connected to overboard openings were treated separately since they are anticipated to have different flow rates.

Viewfactors were calculated between the filters and all points along the 17 lines-of-sight that exist in the SPACE program.

The mass flow rates of the filters can be arbitrarily input at any rate and components anticipated to exist. The mass rates through the filters is a complex function of mass inputs to the volume between the liner and the outer wall of the Orbiter. Primary sources in this region are leakage and mass loss rates of nonmetallic sources within this volume.

For an open payload bay door case, the pressure in the mid fuselage region (between liner and outer Orbiter wall) was specified to be $P_{Mid} = 0.0275 Q_2$ where Q_2 = mass input to mid fuselage region.



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Figure 2 Filters in Payload Bay Liner

The total flow rate through the vents is $\dot{m} = 0.72 Q_2$ for the liner vents and $\dot{m} = 0.28 Q_2$ for the overboard duct vents. Assuming a leakage input to the mid fuselage area that is one half of the total habitation area leakage, the mass flow is $1.35 \times 10^{-2} \text{ g} \cdot \text{s}^{-1}$ for the liner vents and $2.63 \times 10^{-3} \text{ g} \cdot \text{s}^{-1}$ for the overboard vents. Considering the areas of the vents the rates are $3.5 \times 10^{-7} \text{ g} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ for the duct vents and $1.3 \times 10^{-6} \text{ g} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ for the liner vents. This assumes that the flow into the payload bay through the filters, that also vent overboard, is one half the flow given by the above $\dot{m}$ equation.

Incorporating the liner vents into the SPACE program involved modifications to the SPACE program. Appendix B contains an updated major program listing for the modifications to SPACE.

3.3 Plot Routine

The external plot package, NCD/RF PLT, is an independent program that is used to plot NCD and RF output from the SPACE program as a function of start time and time interval of interest (TSTART).

The units are $\text{mol} \cdot \text{cm}^{-2}$ for NCD and $\text{g} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ for RF and decimal hours for time. These data are punched from subroutines in the appropriate format that is accepted by the plot program. When the user accumulates any number (maximum 50) of related monotonically increasing times and number column densities, he can submit these cards as a unit with the following additions. The first card is a title card. The user may use up to 72 columns describing the data. The following cards are the NCD and time data. The last card is blank. In summary, a title card at the beginning and a blank card at the end of the data is all that is required to input the data.

The plot program contains a dynamic scaler for minimums and maximums on both the ordinate (log scale) and abscissa (linear). The program labels each coordinate and plots the data with a line connecting the points. Time intervals between points can be varied.

Figure 3 shows a sample of the plot routine for the return flux resulting from early desorption and outgassing for the simulated OFT-3 mission discussed in detail in section 3.4. The figure shows the return flux levels as they vary for different time intervals in the mission. Figure 4 shows the return flux plot for the entire mission simulation and does include the effects of RCS and OMS engine firings. Figures 3 and 4 demonstrate how the output can be selected to cover portions of the mission. The automatic scaling on the coordinates allows a wide range of decades (ten maximum) as demonstrated in the figures for the return flux values. Included on the figures is a sample of the input data that consists of a title card and the data with a blank card following the data.

```

..
100- MISSION SIMULATION RETURN FLUX PROFILE - OFT3
110- 06. 40. 00. 06. 55. 00. .17E-13
120- 06. 55. 00. 07. 10. 05. .16E-13
130- 07. 10. 00. 07. 25. 00. .27E-14
140- 07. 25. 00. 07. 40. 00. .16E-13
150- 07. 40. 00. 07. 55. 00. .46E-13
160- 07. 55. 00. 08. 10. 00. .15E-13
170-
..

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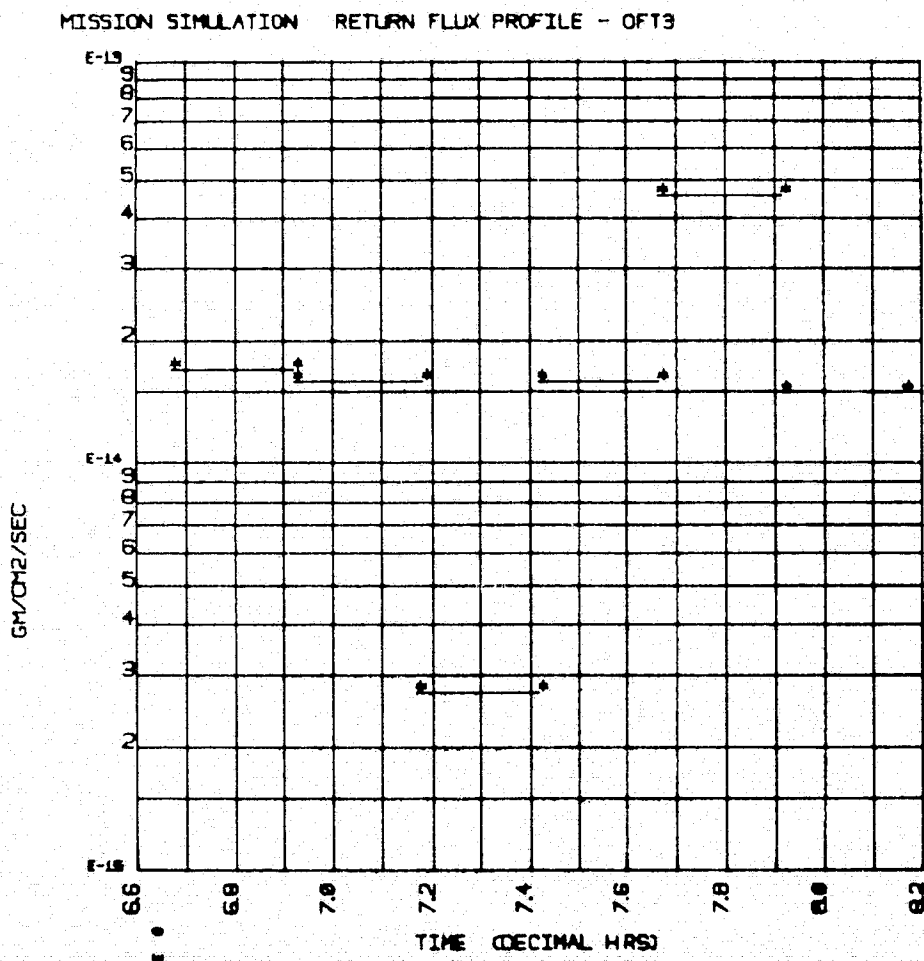


Figure 3 OFT-3 Mission Profile Return Flux Plot

MISSION SIMULATION						RETURN FLUX PROFILE - OFT3	
100-	06.	40.	00.	06.	55.	00.	.17E-13
110-	06.	55.	00.	07.	10.	05.	.16E-13
120-	07.	10.	00.	07.	25.	00.	.27E-14
140-	07.	25.	00.	07.	40.	00.	.16E-13
150-	07.	40.	00.	07.	55.	00.	.46E-13
160-	07.	55.	00.	08.	10.	00.	.15E-13
170-	11.	30.	00.	11.	40.	00.	.14E-13
180-	11.	40.	00.	11.	40.	01.	.28E-06
190-	11.	40.	56.	11.	41.	51.7	.14E-13
200-	35.	50.	00.	36.	00.	00.	.83E-14
210-	48.	00.	00.	48.	10.	00.	.22E-13
220-	59.	40.	00.	59.	50.	00.	.12E-14
230-	105.	40.	00.	105.	50.	00.	.49E-15
240-	162.	29.	00.	162.	05.	05.	.32E-07
250-							

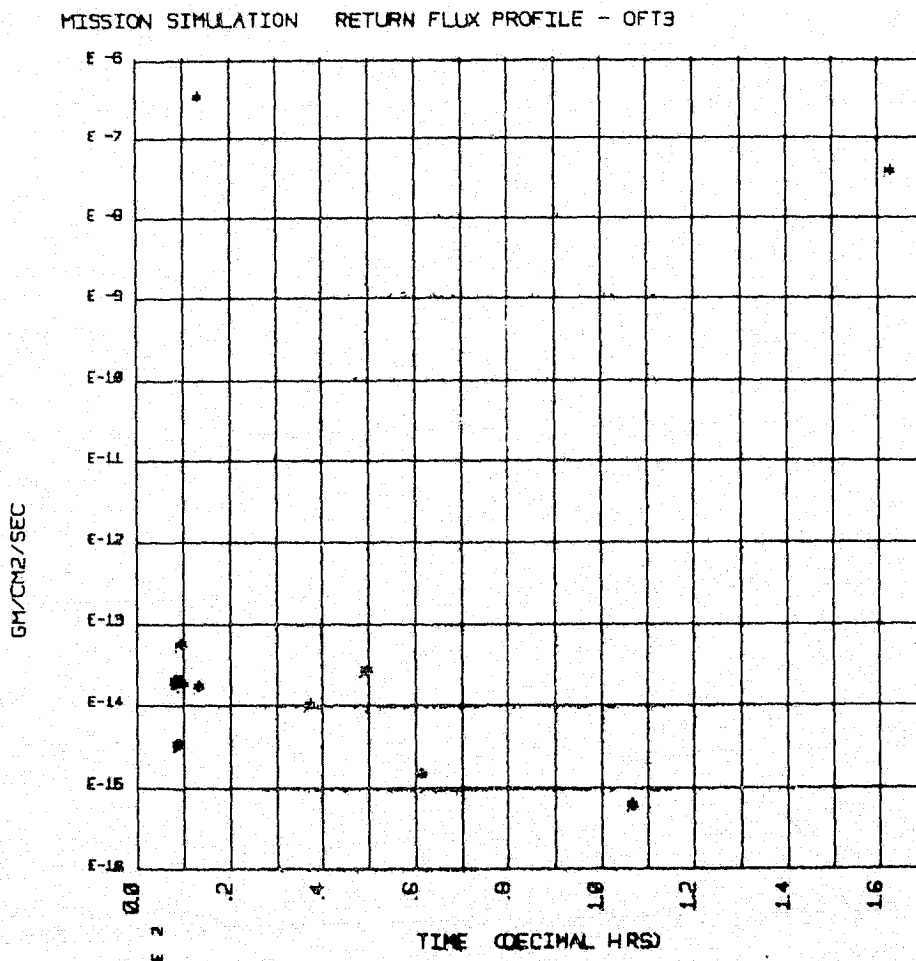


Figure 4 OFT-3 Mission Profile Return Flux Plot

3.4 Mission Profile Model

A mission profile model should ideally be designed to simulate a mission. In the development of such a model, many considerations have to be weighed and alternate routes of handling the simulation evaluated. The thermal conversion program and plot routine are both essential to the development of a mission profile model. These programs were developed to be independent programs until the full logic and data for such a model can be established. To help answer questions and reveal unknown problems, an early flight was analyzed, specifically OFT-3.

This section discusses a procedure for translating an STS mission timeline into input data for the modified NASA SPACE code. Orbital Test Flight No. 3 (OFT-3) to be flown in the fall of 1979 was selected as an example to illustrate the mission analysis capability of the computer program. OFT-3 will have the IECM on board (see Figure 5) which provides a unique opportunity to evaluate existing analytical prediction techniques, particularly the return flux models. The IECM will not provide direct information on mass column density; however, if return flux predictions are found to be accurate, it could be inferred that densities within the cloud were accurately predicted.

A new sample case (#16) has been constructed to illustrate the following items:

- a) A procedure for translating a mission timeline into computer input data.
- b) Some preflight predictions for actual instrumentation flown on the Orbiter can be made for insertion into an OFT-3 mission environments data book.

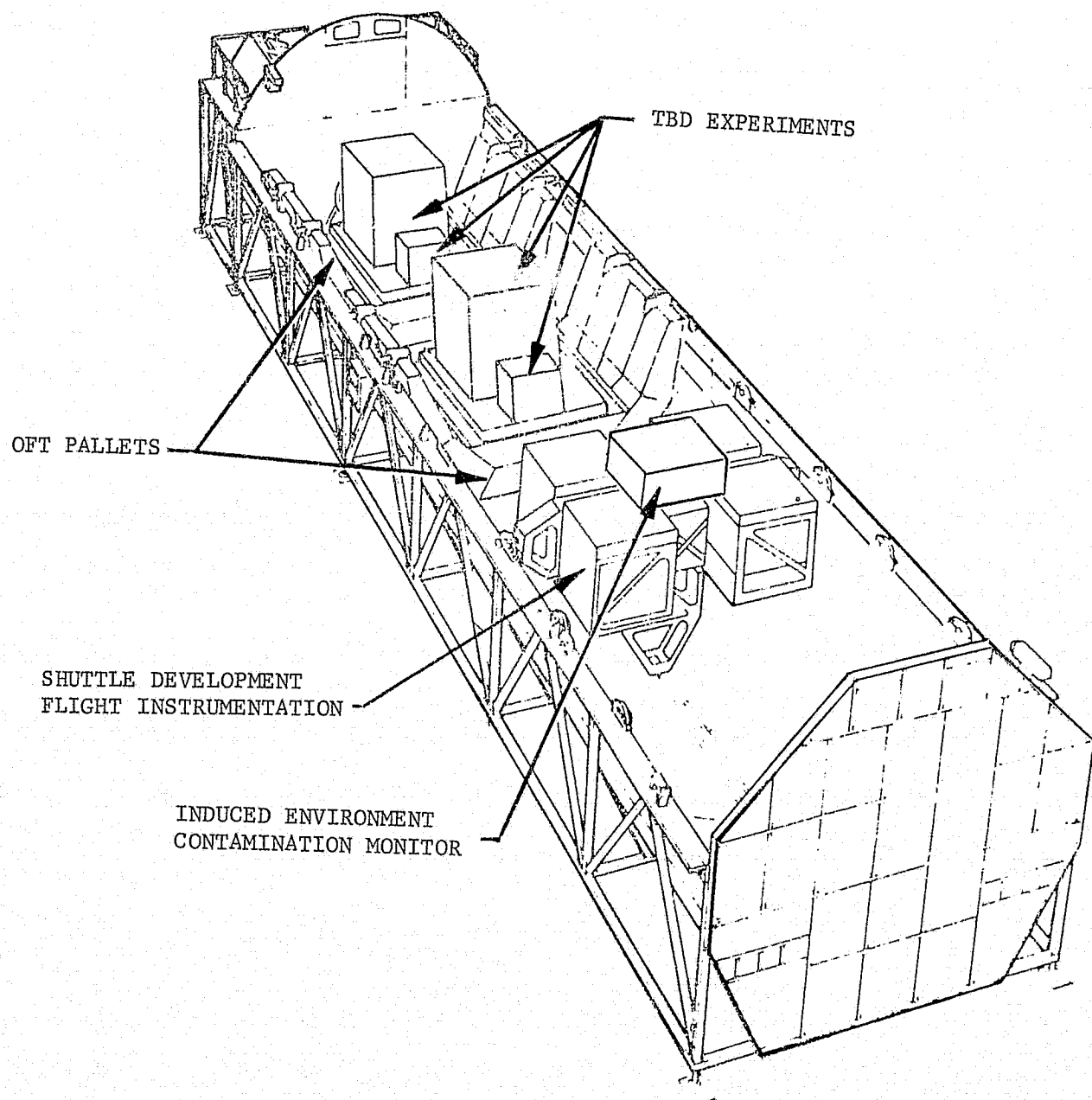


Figure 5 IECM Payload Bay Integration

- c) The use of different temperature profiles to simulate on-orbit surface temperature variation per revolution.
- d) Current capabilities of the analytical tool and areas where modification or extension are required.
- e) Preflight mission analysis using SPACE can result in recommendations for on-orbit operations.

To establish a baseline for the analysis, the following documents were used:

"OFT Payload Planning Status", JSC 10982, Rev D, November 1, 1976.

"RCS Duty Cycles for a Typical Orbiter Maneuver Sequence at IUS Separation", JSC TM No. 14-1111B-128, 22 August 1977.

"IECM (OFT/DFI Configuration) Critical Design Review Documentation Package", 1 December 1977.

Portions of these documents have been reproduced and included as figures and tables within this section.

Time-dependent Orbiter surface temperatures were not available for this study. To construct the additional Orbiter temperature profiles required to simulate actual orbital variations, the minimum and maximum surface temperatures previously delivered were subdivided assuming a sinusoidal variation. These new temperature profiles are representative of day/night variation but purely fictitious.

IECM instrumentation was examined and a decision was made to make return flux predictions that could be compared to the output from the mass spectrometer. Focusing on the mass spectrometer dictates the type of analysis, output and time points to be evaluated. The mission timeline defined in JSC 10982,

Rev D (see Table I) has undoubtedly been modified since November 1976; nevertheless it was used as a baseline.

On this test flight, the Orbiter is held in a +X SI, Z-PEP for 80-100 hours as illustrated in Figure 6. Where the OFT-3 timeline indicates a +X roll, the IUS 180° roll maneuver was substituted to illustrate engine firings and attitude changes. The RCS duty cycles are listed in Table II.

Figure 7 illustrates the installation of the IECM package in the Orbiter bay. The mass spectrometer is located approximately at Orbiter station (1088, 8, 473) as indicated in Figure 7 and was selected for preflight analysis. As indicated in Table III, the mass spectrometer is scheduled to be activated on-orbit sometime after bay pressures have decreased below corona limits. Normal operation will provide 30 samples per minute or 1 sample every 2 seconds. It was assumed that at best a complete scan over the range of mass numbers requires 2 seconds. (This point should be clarified later.) The high data acquisition mode of 300 samples per minute is scheduled to be used when the RMS deploys the IECM.

The acceptance half-angle for the mass spectrometer is approximately 10° which results in a 0.1 steradian field-of-view looking up the Z-axis. It was assumed the inlet tube walls are warm enough to prevent condensation of contaminants.

The mission timeline for OFT-3 given in Table I indicates the payload bay doors are opened 1 hr 30 min after liftoff and the IECM is scheduled to be activated sometime after 6 hours into the mission. It appears that at 2 hr 19 min an OMS firing takes place. This event may be detectable on the QCM's or by

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TABLE I CONTINUED

NASA-S-76-5308

CST		FO/DOY		HOUSTON DATE		BETA ANGLE		MODY		FLIGHT		GMT		EDITION		PUBLICATION DATE		
305:05:00/306:05:00		2/305		November 1, 1979		-41.9		PHASE		OFT 3		305:11:00/306:11:00		Prelim. Rev A		June 25, 1976		
ORBIT		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
MET		19	21	23	25	27	29	31	33	35	37	39	41					
CHN	CDR	SLEEP	PSA	MEAL					CREW 67-01	MEAL					MEAL	PSA	SLEEP	ORBITER CONFIGURATION KIT QTY EPS 2
	PLT	SLEEP	PSA	MEAL	AV 79-11								MEAL	PSA	SLEEP			
DAY/NIGHT																		
EARTH TRACE																		
W/SAR																		
GSTON COVERAGE		- QUI - MAD - ORR - ORR - GDS - ORR - HAW - ACN - ACN - QUI - GWN - HAW -																

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307:05:00/308:05:00		4/307		November 3, 1979				-48.8		PHASE		*OFT 3		307:11:00/308:11:00		Prelim. Rev A		June 25, 1976	
ORBIT		44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59		
MET		67	69	71	73	75	77	79	81	83	85	87	89						
CNR	CDR	SLEEP	P S A	MEAL					MEAL					MEAL	P S A	SLEEP	ORBITER CONFIGURATION KIT QTY EPS 2		
	PLT	SLEEP	P S A	MEAL					MEAL					MEAL	P S A	SLEEP			
DAY/NIGHT																			
EARTH TRACE W/SAR																			
GSTON COVERAGE		- BDA - BDA - MAD - ORR - ORR - AGH - ACN - BDA - ACN - HAW - GDS - AGO																	

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308:05:00/309:05:00		5/308		November 4, 1979				-51.4		PHASE		OFT 3		308:11:00/309:11:00		Prelim. Rev A		June 25, 1976	
ORBIT		60	61	62	63	64	65	66	67	68	69	70	71	72	73	74			
MET		91	93	95	97	99	101	103	105	107	109	111	113						
CMN	CDR	SLEEP		P S A	MEAL					MEAL				MEAL	P S A		SLEEP	ORBITER CONFIGURATION KIT QTY EPS 2	
	PLT	SLEEP		P S A	MEAL					MEAL				MEAL	P S A		SLEEP		
DAY/NIGHT																			
EARTH TRACE W/SAR																			
GSTON COVERAGE		-ORR -QUI -BDA -MAD -ORR -QUI -BDA -MIL -MIL -MIL -AGO -HAW -AGO -ACH -GMM -MAD -ORR -MAD -ORR -MIL -ROS -MIL -ROS -HAW -ACN -ORR -ACN -BDA -ACN -GMM -HAW -AGO -HAW -AGO -ACH -GMM -AGO -QUI -MIL -BDA -BDA -MIL -ROS -ROS -ROS -GMM -HAW -GOS -QUI -HAW -AGO -HAW -AGO -HAW -AGO																	
TORS COVERAGE																			
DEORBIT** OPPORTUNITIES		94:42				102:49													
ATT	REQD																		
MHVRS	CONT.	▲ IMU ▲ IMU																	
NOTES		**Approx. Deorbit Burn Times for EAFB Landing • FC Purge • Status Rpt at HAW (105:05 - 105:14) • C & W Lamp Ck • APU/Hyd Thermal Ck • Includes EPS/ECLSS Ck • L10H (A) Changeout • FC Purge FTR's Scheduled on OFT-3 TJS 05-10 - Orbiter TCS Capability Assessment PROP 41-10 - Propellant Dump Timeline PROP 43-05 - OMS Propellant Quantity Sensor MECH 54-01 - Payload Handling (TC 1 & 2) MECH 54-11 - Contamination Monitoring CREW 67-01 - Cabin Acoustical Noise AV 70-01 - On Orbit Navigation Performance AV 71-03 - IMU Optical Alignment (TC 2) AV 71-17 - Crew Optical Alignment Sight (COAS) Performance AV 73-01 - Displays and Controls Subsystems Performance AV 74-08 - CCTV Performance AV 74-11 - S-Band Ranging Performance (Insufficient data to schedule) AV 79-11 - In-Orbit Attitude Hold Performance *Indicates FTR's scheduled on this page																	

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TABLE I CONTINUED

NASA-S-76-5312

CST		FOY/DBY		HOUSTON DATE		BETA ANGLE		MOON PHASE		FLIGHT		GMT		EDITION		PUBLICATION DATE	
309:05:00/310:05:00		6/309		November 5, 1979		-53.1				OFT 3		309:11:00/310:11:00		Prelim. Rev A		June 25, 1976	
ORBIT	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	
MET		115	117	119	121	123	125	127	129	131	133	135	137				
CMN	COR	SLEEP	P S A	MEAL			MEAL	AV 70-01		MEAL	P S A		SLEEP			P S A	DRILLER COMPL. QUANTITY KIT EPS 2
	PLT	SLEEP	P S A	MEAL			MEAL			MEAL	P S A		SLEEP			P S A	
DAY/NIGHT																	
EARTH TRACE																	
W/SRR																	
GSDN COVERAGE		-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD
TDRS COVERAGE		-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD	-MAD
DEORBIT** OPPORTUNITIES																	
RTI REQD																	
MNVRS CONT.																	
NOTES		**Approx. Deorbit Burn Times for EAFB Landing FC Purge Status Rpt at AGO (127:03 - 127:08) C & W Lamp Ck SAPU/Hyd Thermal Ck L10H (B) Changeout FC Purge Includes EPS/ECLSS, Ck FTR's Scheduled on OFT-3 1/5 06-10 - Orbiter VCS Capability Assessment PROP 41-10 - Propellant Dump Timeline PROP 43-05 - OMS Propellant Quantity Sensor MECH 54-01 - Payload Handling (TC 1 & 2) MECH 54-11 - Contamination Monitoring CREW 67-01 - Cabin Acoustical Noise AV 70-01 - On Orbit Navigation Performance AV 71-03 - IMU Optical Alignment (TC 2) AV 71-17 - Crew Optical Alignment Sight (COAS) Performance AV 73-01 - Displays and Controls Subsystems Performance AV 74-08 - CCIV Performance AV 74-11 - S-Band Ranging Performance (Insufficient data to schedule) AV 79-11 - In-Orbit Attitude Hold Performance *Indicates FTR's scheduled on this page															

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NASA-S-76-5313

CST		FD/DOY		HOUSTON DATE				BETA ANGLE		MOON		FLIGHT		GHT		EDITION		PUBLICATION DATE	
310:05:00/311:05:00		7/310		November 6, 1979				-54.0		PHASE		OFT 3		310:11:00/311:11:00		Prelim. Rev A		June 25, 1976	
ORBIT		91	92	93	94	95	96	97	98	99	100	101	102	103	104	105			
MET		139	141	143	145	147	149	151	153	155	157	159	161						
CMN	CDR	MEAL			MEAL		PRE-ENTRY	MEAL	P S A		SLEEP		P S A	MEAL			DRILLER CONFIGURATION KIT QTY 2		
	PLT	MEAL		AV 71-03 (TC 2) AV 71-17 (TC 1)	MEAL		PRE-ENTRY	MEAL	P S A		SLEEP		P S A	MEAL					
DAY/NIGHT																			
EARTH TRACE																			
W/SAR																			
GSTON COVERAGE		ORR - QUI - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	ORR - GDS - ROS - MAD	
TORS COVERAGE																			
DEORBIT** OPPORTUNITIES																			
RTI REQD		▲ FTR																	
MNVR CONT.		▲ IMU																▲ IMU	
NOTES		**Approx. Deorbit Burn Times for EAFB Landing • FC Purge FTR's Scheduled on OFT-3 Y22 06-10 - Orbiter TCS Capability Assessment PROP 41-10 - Propellant Dump Timeline PROP 43-05 - DNS Propellant Quantity Sensor MECH 54-01 - Payload Handling (TC 1 & 2) MECH 54-11 - Contamination Monitoring CREW 67-01 - Cabin Acoustical Noise AV 70-01 - On Orbit Navigation Performance • AV 71-03 - IMU Optical Alignment (TC 2) • AV 71-17 - Crew Optical Alignment Sight (COAS) Performance • AV 73-01 - Displays and Controls Subsystems Performance AV 74-08 - CCTV Performance AV 74-11 - S-Band Ranging Performance (Insufficient data to schedule) AV 79-11 - In-Orbit Attitude Hold Performance *Indicates FTR's scheduled on this page • Status Rpt at GMM (149:22.4 149:38) • C & W Lamp Ck • APU/Hyd Thermal Ck • LION (A) Changeout • FC Purge • Includes EPS/ECLSS Ck • Initiation of Rotational Attitude Control Mode (+X Roll)																• FC Purge	

TABLE I CONCLUDED

NASA-S-76-5314

TST		FD/CS		MOON		FLIGHT		EDITION		PUBLICATION DATE	
311:05:00/312:05:00		8/311		November 7, 1979		OFT 3		311:11:00/312:11:00		Prelim. Rev A	
ORBIT		106		107		108		109			
MET		163		165		167					
CMN		COR		PLT						OFFICE CONFIRMATION	
DAY/NIGHT										KIT #	
EARTH TRACE											
W/SAR											
GSTON											
COVERAGE											
TORS											
COVERAGE											
DEORBIT **											
OPPORTUNITIES											
ATT REQ											
MANVS											
CONT.											
NOTES											

**Approx. Deorbit Burn
 Times for EAFB Landing
 *PROP 43-05 (50% - single)
 :On-Orbit to FCS C/O GPC Reconfiguration (ORR)
 :PBDM Close & CCTV Performance (AV 74-08)
 :FCS C/O Coverage (MIL)
 :Entry GPC Reconfiguration (MIL)
 FTR's Scheduled on OFT-3
 FTS 06-10 - Orbiter TCS Capability Assessment
 PROP 41-10 - Propellant Dump Timeline
 *PROP 43-05 - OMS Propellant Quantity Sensor
 MECH 54-01 - Payload Handling (TC 1 & 2)
 MECH 54-11 - Contamination Monitoring
 CREW 67-01 - Cabin Acoustical Noise
 AV 70-01 - On Orbit Navigation Performance
 AV 71-03 - IMU Optical Alignment (TC 2)
 AV 71-17 - Crew Optical Alignment Sight (COAS) Performance
 AV 73-01 - Displays and Controls Subsystems Performance
 *AV 74-08 - CCTV Performance
 AV 74-11 - S-Band Ranging Performance (Insufficient data to schedule)
 AV 79-11 - In-Orbit Attitude Hold Performance
 *Indicates FTR's scheduled on this page

REVISION
 CONFIGURATION
 KIT #

TABLE II ENGINE DUTY CYCLES

Time (Sec)	Jets Turned On	Jets Turned Off
0.00	L4D, R4U	
1.00	F2U, L2D	R4U
1.16		F2U, L4D, L2D
11.28	F1L, R4R	
11.36		F1L, R4R
15.60	F1D, F2D, L4U, R4U	
15.64		F1D, F2D, L4U, R4U
16.24	F1D, F2D, L4U, R4U	
16.28		F1D, F2D, L4U, R4U
53.76	F1D, F2D, L4U, R4U	
53.80		F1D, F2D, L4U, R4U
55.96	L4U, R4D	
56.00		L4U, R4D
111.72	F1D, F2D, L4U, R4U	
111.76		F1D, F2D, L4U, R4U
136.76	F1D, F2D, L4U, R4U	
136.80		F1D, F2D, L4U, R4U
160.16	L4D, R4U	
160.20		L4D, R4U
180.00	L4U, R4D	
181.12	F1U, R2D	L4U
181.16	F3U, L4D	F1U, R2D
181.28		F3U, L4D, R4D

TAIL TO SUN $\beta = 0^\circ$
(Z - PEP, +X SI)

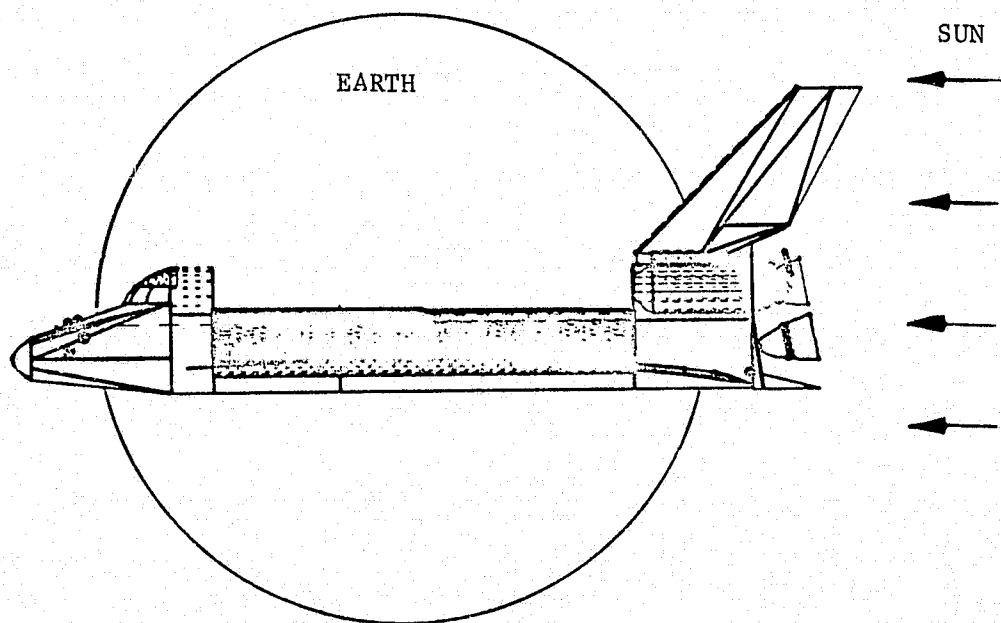


Figure 6 OFT-3 Attitude

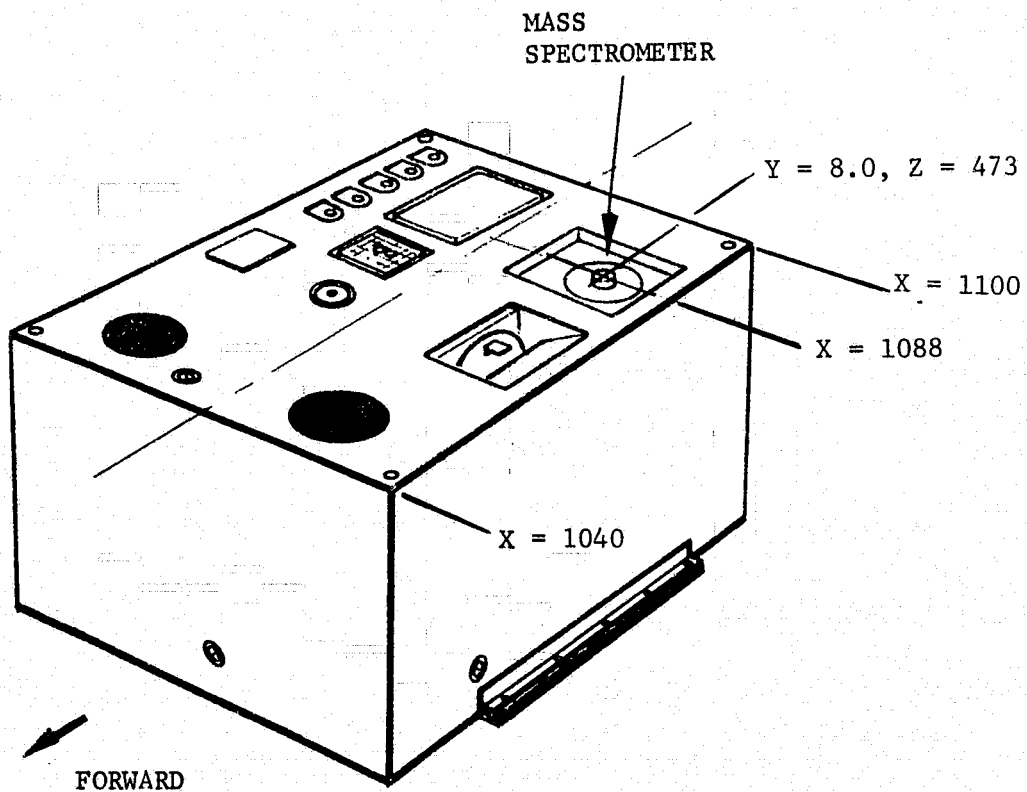


Figure 7 IECM Location

TABLE III. OFT/IECM INSTRUMENT OPERATION CHART

MISSION PHASES		PRELAUNCH	ASCENT	ON-ORBIT	RMS AND INTERRUPT	DESENT	POST
DEW POINTER		←→	←→			←→	←→
HUMIDITY MONITOR		←→	←→			←→	←→
CASCADE MONITOR	STAGES	←→	←→			←→	←→
	NVR	←→					←→
AIR SAMPLER		←→	←→			←→	←→
MASS SPEC	NORMAL			←→			
	FAST				←→		
CAMERA/PHOTOMETER				←→			
OPTICAL MODULE		←→		←→			←→
TQCM		←→					←→
CQCM		←→					←→

←→ UNIT OPERATING

the mass spectrometer if it could be activated earlier than planned.

Several time intervals were examined early in the flight (fifth orbit) to illustrate the variation expected in the mass spec data due to day/night cycling. During this orbit, it was assumed the vehicle attitude is +X SI, Z-PEP so the velocity vector is changing constantly with respect to vehicle coordinates (see Figure 6).

The flight appears relatively uninteresting from a contamination standpoint until about 11 hours 40 minutes into the mission where an Orbiter attitude maneuver is scheduled. A +X roll for a thermal control test is to be initiated at this point for a 10-15 minute time period. Because the RCS duty cycles are not yet available for the maneuver, a 180° +X roll requiring 180 seconds to complete was inserted to illustrate typical engine sequencing. The complete 180° roll requires 13 discrete DAP cycles involving the simultaneous firing of 2, 3 and 4 thrusters. Of this 13 events 9 are the minimum impulse bit of 0.04 seconds, 1 is .12 seconds and 1 is .16 seconds. Based on current understanding of the mass spec, none of these events can be observed accurately with the normal data acquisition mode. Even the remaining two primary firings to initiate and terminate the roll rate last for only 1.0 and 1.12 seconds respectively. The 2 second per sample rate for the mass spec may not even be capable of accurately monitoring the primary burns during this roll maneuver. Nevertheless, to illustrate the construction of an OFT-3 mission data book, several of these engine firing events were examined.

At 16 hours, the Orbiter is scheduled to maintain a +X SI attitude for 96 hours. Its prior attitude is not specified

from data at hand so engine firings could not be predicted.

The flight is again rather uninteresting in terms of contamination events except for the fuel cell purges at 36, 48, 60, 72, 84, 96, 105, 128 and 139 hours. The current SPACE code does not predict this release of H_2O , H_2 and O_2 . Several points are evaluated during this time period to estimate the outgassing background.

At 142 hours an FTR is scheduled that requires an attitude change. Here again, the test requirements are not available and no engine firing sequence can be defined.

One hundred fifty hours into the mission a +X roll is again initiated. As before, a 180° roll maneuver could be substituted.

The OMS engines are scheduled to be tested at 162 hrs, 29 minutes just before the payload bay doors are closed at 163 hours.

A summary of selected time intervals is provided in Table IV.

A preliminary evaluation of the mission timeline for OFT-3 has illustrated the analysis procedure and type of data required to make preflight predictions for on-board instrumentation. The IECM mass spectrometer was chosen because it monitors return flux which is directly amenable to prediction by the current NASA SPACE code.

Where information was incomplete (RCS duty cycles, thermal profiles, vehicle attitude) representative data were used to construct a preliminary mission data book.

Modifications were made to the SPACE code to facilitate mission analysis. Sample Case No. 16 was constructed for the

TABLE IV OFT-3 MISSION TIMELINE DATA

Time (MST)	Source	V _X km/sec	V _Y km/sec	V _Z km/sec	Attitude	Temp Profile Atcode	Day Night	Comments	Com- puted	Time Interval		
										Hr	Min	Sec
6:40:00	Outgassing	6.62	-3.83	0 ¹	Z-PEP +X SI ²	2	N	Activate IECH Mass Spec	X		15	
6:55:00	Outgassing	0	-7.65	0		TMin	N		X		15	
7:10:00	Outgassing	-6.62	-3.83	0		1	D		X		15	
7:25:00	Outgassing	-6.62	3.83	0		2	D		X		15	
7:40:00	Outgassing	0	7.65	0		3	D		X		15	
7:55:00	Outgassing	6.62	3.83	0		4	D		X		15	
8:10:00	Outgassing	V ³	V	V		V	V		0	3	20	
11:30:00	Outgassing	6.62	3.83	0		TMax	D		X		10	
11:40:00					+X SI			Initiate +X Roll, 0 - 1°/sec				
	7246, 7345	0	-7.65	0	Roll = 0°	2	D		X			1.0
11:40:01	7125, 7226, 7246	0	-7.65	0		2	D		0			.16
11:40:01.16	Outgassing	0	-7.65	0		2	D		0			.12
11:40:11.28	7113, 7344	0	-7.51	-1.46	Roll = 11°	2	D		0			.04
11:40:11.36	Outgassing	0	-7.51	-1.46		2	D		0			4.24
11:40:15.60	7116, 7126, 7245, 7345	0	-7.37	-2.06	Roll = 16°	2	D		0			.04
11:40:15.64	Outgassing	0	-7.37	-2.06		2	D		0			.6
11:40:16.24	7116, 7126, 7245, 7345	0	-7.34	-2.14		2	D		0			.04
11:40:16.28	Outgassing	0	-7.34	-2.14		2	D		0			37.5
11:40:53.76	7116, 7126, 7245, 7345	0	-4.52	-6.17	Roll = 54°	2	D		0			.04
11:40:53.80	Outgassing		-4.52	-6.17		2	D		0			2.16
11:40:55.96	7245, 7346		-4.28	-6.34		2	D		0			.04
11:40:56.00	Outgassing		-4.28	-6.34	Roll = 56°	2	D		0			55.7
11:41:51.72	7116, 7126, 7245, 7345		+2.83	-7.1	Roll = 112°	2	D		X			.04
11:42:16.76	Outgassing		2.83	-7.1	Roll = 137°	2	D		0			28
11:42:16.76	7116, 7126, 7245, 7345		+5.50	-5.3		2	D		0			.04
11:42:16.80	Outgassing		5.50	-5.3		2	D		0			23.4
11:42:40.16	7246, 7345		+7.19	-2.62	Roll = 160°	2	D		0			.04
11:42:40.20	Outgassing		7.19	-2.62		2	D		0			20
11:43:00	7245, 7346		7.65	0	Roll = 180°	2	D	Counteract Roll Rate	X			1.12
11:43:01.12	7115, 7326, 7346		7.65	0		2	D		0			.04
11:43:01.16	7135, 7246, 7346		7.65	0		2	D	End Roll	0			.12
11:43:01.28	Outgassing	V	V	V	V	V	V	Assume +X SI, Z-PEP Attitude	0	24	7	
35:50:00	Fuel Cell Purge	6.620	3.83	0	Z-PEP +X SI	4	D		X		10	
36:00:00	Outgassing	V	V	V		V	V		0	12		
48:00:00	F. C. Purge	0	7.65	0		3	D		X		10	
48:10:00	Outgassing	V	V	V		V	V		0	11	30	
59:40:00	F. C. Purge	6.62	3.83	0		1	D		X		10	
59:50:00	Outgassing	V	V	V		V	V		0	45	50	
105:40:00	F. C. Purge	0	-7.65	0		Tmin	N		X		10	
105:50:00	Outgassing	V	V	V		V	V		0	56	39	
162:29:00	OMS Engines								X			5
162:29:05	Outgassing	V	V	V		V	V	Close Bay Doors	0		31	

Nominal Altitude = 398 km (215 n.m.)

¹ V_Z was actually set to -100 km/sec because return flux model requires an angle greater than 90° between LOS and V_A.² Actual orbiter attitude is not known during this time.³ V = Varies with time.

OFT-3 mission to illustrate the form of a typical input deck and to begin the construction of an OFT-3 mission data book. As additional data become available, time segments can be added or deleted to update the data book.

Figure 8 is a detailed printout of the return flux values and input data requirements for the first time interval of the simulated OFT-3 mission. Reports number 1,3, 7, 8 and 11 show the inputs used to determine the return flux values. Reports 41, 42 and 43 show the actual predicted results. Figure 9 lists the summary only for the remaining time periods. These predictions are presented in plot form in Figures 3 and 4. The value of the approach presented here is that the time intervals can be increased or decreased at will. This allows rather static situations to be spot checked only and eliminates reproducing repetitious events such as engine firings that occur with similar mission parameters. Figures 3 and 4 show that the return flux values for the combined environment of early desorption, outgassing and engines varies from the 10^{-16} to the $10^{-7} \text{ g} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ range.

REPORT NO. 1 *** OFT-3 PREFLIGHT EVAL. *** IECM MASS SPEC (06:40:00-06:55:00)

01/26/78 09.01.09. PAGE 1

CONTENTS: LISTING OF INPUT CONTROL PARAMETERS

Figure 8 Detailed Input/Results for First OFT-3 Time Interval

TSTOP = .6E+01, .55E+02, 0.0,
ATCODE = 0.0,
GO = T,
\$END

CONTENTS: LIST OF SOURCES TO BE EVALUATED

* * * SURFACES * * *

SEQUENCE NO.	IDENT NO.	SECTION	MATERIAL	AREA (SQ IN)
1	20	RADOOR	TEFLON	12200.
2	22	RADOOR	TEFLON	12200.
3	24	RADOOR	TEFLON	12200.
4	26	RADOOR	TEFLON	12200.
5	30	RADOOR	TEFLON	12200.
6	32	RADOOR	TEFLON	12200.
7	34	RADOOR	TEFLON	12200.
8	36	RADOOR	TEFLON	12200.
9	40	RADOOR	TEFLON	25580.
10	42	RADOOR	TEFLON	25580.
11	44	RADOOR	TEFLON	25580.
12	46	RADOOR	TEFLON	25580.
13	50	RADOOR	TEFLON	25580.
14	52	RADOOR	TEFLON	25580.
15	54	RADOOR	TEFLON	25580.
16	56	RADOOR	TEFLON	24990.
17	21	FUSLAG	LRSI	12200.
18	23	FUSLAG	LRSI	12200.
19	25	FUSLAG	LRSI	12200.
20	27	FUSLAG	LRSI	12200.
21	31	FUSLAG	LRSI	12200.
22	33	FUSLAG	LRSI	12200.
23	35	FUSLAG	LRSI	12200.
24	37	FUSLAG	LRSI	12200.
25	41	FUSLAG	LRSI	25580.
26	43	FUSLAG	LRSI	25580.
27	45	FUSLAG	LRSI	25530.
28	47	FUSLAG	LRSI	25580.
29	51	FUSLAG	LRSI	24990.
30	53	FUSLAG	LRSI	24990.
31	55	FUSLAG	LRSI	24990.
32	57	FUSLAG	LRSI	24990.
33	202	FUSLAG	LRSI	32520.
34	203	FUSLAG	LRSI	32520.
35	230	FUSLAG	LRSI	25730.
36	240	FUSLAG	LRSI	16340.
37	241	FUSLAG	LRSI	16340.
38	250	FUSLAG	LRSI	19580.
39	260	FUSLAG	LRSI	20240.
40	301	FUSLAG	LRSI	26600.
41	305	FUSLAG	LRSI	30930.
42	306	FUSLAG	NOVEX	30930.
43	307	FUSLAG	NOVEX	24770.
44	311	FUSLAG	LRSI	26600.
45	315	FUSLAG	LRSI	30930.
46	316	FUSLAG	NOVEX	30930.
47	317	FUSLAG	NOVEX	24770.
48	420	FUSLAG	LRSI	1312.
49	425	FUSLAG	LRSI	1312.
50	60	OMS	LRSI	1145.
51	62	OMS	LRSI	7850.

Figure 8 continued

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OF POOR QUALITY

37

52	64	OMS	LRSI	37920.
53	66	OMS	LRSI	1991.
54	67	OMS	LRSI	2028.
55	68	OMS	LRSI	415.
56	70	OMS	LRSI	895.
57	72	OMS	LRSI	1406.
58	74	OMS	LRSI	1312.
59	76	OMS	LRSI	715.
60	77	OMS	LRSI	600.
61	80	OMS	LRSI	1145.
62	82	OMS	LRSI	7813.
63	84	OMS	LRSI	37740.
64	86	OMS	LRSI	1991.
65	87	OMS	LRSI	2028.
66	88	OMS	LRSI	415.
67	90	OMS	LRSI	895.
68	92	OMS	LRSI	1406.
69	94	OMS	LRSI	1312.
70	96	OMS	LRSI	715.
71	97	OMS	LRSI	601.
72	100	WING	NOMEX	6356.
73	102	WING	NOMEX	29590.
74	104	WING	NOMEX	9125.
75	110	WING	NOMEX	23340.
76	112	WING	NOMEX	19380.
77	115	WING	LRSI	19280.
78	117	WING	HRSI	5650.
79	118	WING	HRSI	2508.
80	119	WING	LRSI	3302.
81	121	WING	RCC	2251.
82	122	WING	RCC	3123.
83	130	WING	NOMEX	6356.
84	132	WING	NOMEX	29590.
85	134	WING	NOMEX	9125.
86	140	WING	NOMEX	23340.
87	142	WING	NOMEX	19380.
88	145	WING	LRSI	19280.
89	147	WING	HRSI	5650.
90	148	WING	HRSI	2508.
91	149	WING	LRSI	3302.
92	151	WING	RCC	2251.
93	152	WING	RCC	3123.
94	106	ELEVON	NOMEX	6499.
95	107	ELEVON	NOMEX	17210.
96	136	ELEVON	NOMEX	6499.
97	137	ELEVON	NOMEX	9125.
98	450	ELEVON	NOMEX	138.
99	451	ELEVON	NOMEX	415.
100	452	ELEVON	NOMEX	692.
101	453	ELEVON	NOMEX	960.
102	454	ELEVON	NOMEX	1246.
103	455	ELEVON	NOMEX	1523.
104	456	ELEVON	NOMEX	1800.
105	457	ELEVON	NOMEX	2076.
106	458	ELEVON	NOMEX	2353.
107	459	ELEVON	NOMEX	2630.
108	460	ELEVON	NOMEX	138.
109	461	ELEVON	NOMEX	415.
110	462	ELEVON	NOMEX	692.
111	463	ELEVON	NOMEX	969.
112	464	ELEVON	NOMEX	1246.
113	465	ELEVON	NOMEX	1523.
114	466	ELEVON	NOMEX	1800.

Figure 8 continued

115	467	ELEVON	NOMEX	2076.
116	468	ELEVON	NOMEX	2353.
117	469	ELEVON	NOMEX	2630.
118	160	CREW	RCC	7191.
119	161	CREW	LRSI	9348.
120	162	CREW	LRSI	9348.
121	163	CREW	LRSI	3380.
122	164	CREW	LRSI	3380.
123	165	CREW	LRSI	4253.
124	166	CREW	LRSI	4253.
125	167	CREW	HRSI	12590.
126	168	CREW	HRSI	12590.
127	169	CREW	HRSI	9600.
128	170	CREW	HRSI	9600.
129	171	CREW	HRSI	3705.
130	172	CREW	HRSI	3705.
131	174	CREW	LRSI	20720.
132	175	CREW	LRSI	10150.
133	177	CREW	LRSI	10150.
134	180	CREW	WINDOW	1424.
135	181	CREW	WINDOW	1424.
136	182	CREW	WINDOW	1424.
137	183	CREW	WINDOW	1424.
138	184	CREW	WINDOW	1424.
139	185	CREW	WINDOW	1424.
140	190	CREW	LRSI	10250.
141	380	TAIL	LRSI	16920.
142	381	TAIL	LRSI	16920.
143	382	TAIL	LRSI	6833.
144	383	TAIL	LRSI	6833.
145	384	TAIL	LRSI	13940.
146	385	TAIL	LRSI	13940.
147	386	TAIL	LRSI	6116.
148	387	TAIL	LRSI	6116.
149	388	TAIL	LRSI	2744.
150	389	TAIL	LRSI	2744.
151	390	TAIL	LRSI	1160.
152	391	TAIL	LRSI	1160.
153	392	TAIL	LRSI	3081.
154	393	TAIL	LRSI	3081.
155	399	TAIL	HRSI	3823.
156	1	BAY	LINER	26620.
157	2	BAY	LINER	26620.
158	3	BAY	LINER	26620.
159	4	BAY	LINER	26620.
160	5	BAY	LINER	26620.
161	6	BAY	LINER	26620.
162	7	BAY	LINER	26620.
163	8	BAY	LINER	26620.
164	11	BAY	BLKHED	32690.
165	13	BAY	BLKHED	32690.
166	440	BAY	LINER	3444.
167	441	BAY	LINER	3444.
168	442	BAY	LINER	3444.
169	443	BAY	LINER	3444.
170	445	BAY	LINER	3444.
171	446	BAY	LINER	3444.
172	447	BAY	LINER	3444.
173	448	BAY	LINER	3444.
174	570	FILTER	FILI	207.
175	571	FILTER	FILI	207.
176	572	FILTER	FILI	207.
177	573	FILTER	FILI	207.

Figure 8 continued

178	580	FILTER	FILI	207.
179	581	FILTER	FILI	207.
180	582	FILTER	FILI	207.
181	583	FILTER	FILI	207.
182	575	FILTER	FILO	144.
183	576	FILTER	FILO	144.
184	577	FILTER	FILO	144.
185	578	FILTER	FILO	144.
186	585	FILTER	FILO	144.
187	586	FILTER	FILO	144.
188	587	FILTER	FILO	144.
189	588	FILTER	FILO	144.

CONTENTS: LIST OF SURFACE TEMPERATURES THAT WILL BE USED

SEQUENCE NO.	IDENT NO.	TEMP (DEG C)	MATERIAL	AREA (SQ IN)
1	20	-34.	TEFLON	12200.
2	22	-14.	TEFLON	12200.
3	24	-32.	TEFLON	12200.
4	26	-14.	TEFLON	12200.
5	30	-14.	TEFLON	12200.
6	32	-34.	TEFLON	12200.
7	34	-32.	TEFLON	12200.
8	36	-14.	TEFLON	12200.
9	40	17.	TEFLON	25580.
10	42	-31.	TEFLON	25580.
11	44	10.	TEFLON	25580.
12	46	-20.	TEFLON	25580.
13	50	17.	TEFLON	25580.
14	52	-31.	TEFLON	25580.
15	54	9.	TEFLON	25580.
16	56	-20.	TEFLON	24990.
17	21	-34.	LRSI	12200.
18	23	-14.	LRSI	12200.
19	25	-32.	LRSI	12200.
20	27	-14.	LRSI	12200.
21	31	-14.	LRSI	12200.
22	33	-34.	LRSI	12200.
23	35	-14.	LRSI	12200.
24	37	-32.	LRSI	12200.
25	41	-38.	LRSI	25580.
26	43	-35.	LRSI	25580.
27	45	-38.	LRSI	25580.
28	47	-35.	LRSI	25580.
29	51	-38.	LRSI	24990.
30	53	-35.	LRSI	24990.
31	55	-38.	LRSI	24990.
32	57	-35.	LRSI	24990.
33	202	8.	LRSI	32520.
34	203	8.	LRSI	32520.
35	230	81.	LRSI	25730.
36	240	68.	LRSI	16340.
37	241	81.	LRSI	16340.
38	250	-12.	LRSI	19580.
39	260	26.	LRSI	20240.
40	301	-12.	LRSI	26600.
41	305	-3.	LRSI	30930.
42	306	11.	NOMEX	30930.
43	307	-17.	NOMEX	24770.
44	311	-12.	LRSI	26600.
45	315	-3.	LRSI	30930.
46	316	12.	NOMEX	30930.
47	317	-17.	NOMEX	24770.
48	420	-17.	LRSI	1312.
49	425	-17.	LRSI	1312.
50	60	-27.	LRSI	1145.
51	62	-28.	LRSI	7850.
52	64	-13.	LRSI	37920.
53	66	37.	LRSI	1991.

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Figure 8 continued

54	67	46.	LRSI	2028.
55	68	42.	LRSI	415.
56	70	39.	LRSI	895.
57	72	39.	LRSI	1406.
58	74	46.	LRSI	1312.
59	76	38.	LRSI	715.
60	77	41.	LRSI	600.
61	80	-73.	LRSI	1145.
62	82	-73.	LRSI	7813.
63	84	-13.	LRSI	37740.
64	86	43.	LRSI	1991.
65	87	46.	LRSI	2028.
66	88	42.	LRSI	415.
67	90	39.	LRSI	895.
68	92	39.	LRSI	1406.
69	94	46.	LRSI	1312.
70	96	38.	LRSI	715.
71	97	41.	LRSI	601.
72	100	5.	NOMEX	6356.
73	102	28.	NOMEX	29590.
74	104	19.	NOMEX	9125.
75	110	15.	NOMEX	23340.
76	112	14.	NOMEX	19380.
77	115	-6.	LRSI	19280.
78	117	15.	HRSI	5650.
79	118	13.	HRSI	2508.
80	119	11.	LRSI	3302.
81	121	15.	RCC	2251.
82	122	13.	RCC	3123.
83	130	5.	NOMEX	6356.
84	132	28.	NOMEX	29590.
85	134	19.	NOMEX	9125.
86	140	15.	NOMEX	23340.
87	142	14.	NOMEX	19380.
88	145	-6.	LRSI	19280.
89	147	15.	HRSI	5650.
90	148	13.	HRSI	2508.
91	149	11.	LRSI	3302.
92	151	15.	RCC	2251.
93	152	13.	RCC	3123.
94	106	27.	NOMEX	6499.
95	107	25.	NOMEX	17210.
96	136	27.	NOMEX	6499.
97	137	25.	NOMEX	9125.
98	450	24.	NOMEX	138.
99	451	24.	NOMEX	415.
100	452	24.	NOMEX	692.
101	453	24.	NOMEX	960.
102	454	24.	NOMEX	1246.
103	455	27.	NOMEX	1523.
104	456	27.	NOMEX	1600.
105	457	27.	NOMEX	2076.
106	458	27.	NOMEX	2353.
107	459	27.	NOMEX	2630.
108	460	24.	NOMEX	138.
109	461	24.	NOMEX	415.
110	462	24.	NOMEX	692.
111	463	24.	NOMEX	969.
112	464	24.	NOMEX	1246.
113	465	27.	NOMEX	1523.
114	466	27.	NOMEX	1800.
115	467	27.	NOMEX	2076.
116	468	27.	NOMEX	2353.

Figure 8 continued

117	469	27.	NOMEX	2630.
118	160	2.	RCC	7191.
119	161	9.	LRSI	9348.
120	162	4.	LRSI	9348.
121	163	20.	LRSI	3380.
122	164	20.	LRSI	3380.
123	165	25.	LRSI	4253.
124	166	25.	LRSI	4253.
125	167	-32.	HRSI	12590.
126	168	-33.	HRSI	12590.
127	169	-56.	HRSI	9600.
128	170	-56.	HRSI	9600.
129	171	-48.	HRSI	3705.
130	172	-48.	HRSI	3705.
131	174	-12.	LRSI	20720.
132	175	-60.	LRSI	10150.
133	177	-61.	LRSI	10150.
134	180	-16.	WINDOW	1424.
135	181	-14.	WINDOW	1424.
136	182	-50.	WINDOW	1424.
137	183	-8.	WINDOW	1424.
138	184	-14.	WINDOW	1424.
139	185	-16.	WINDOW	1424.
140	190	-9.	LRSI	10250.
141	380	-47.	LRSI	16920.
142	381	-46.	LRSI	16920.
143	382	-49.	LRSI	8633.
144	383	-49.	LRSI	8633.
145	384	-40.	LRSI	13940.
146	385	-40.	LRSI	13940.
147	386	-46.	LRSI	6116.
148	387	-46.	LRSI	6116.
149	388	-41.	LRSI	2744.
150	389	-36.	LRSI	2744.
151	390	-41.	LRSI	1160.
152	391	-36.	LRSI	1160.
153	392	-41.	LRSI	3081.
154	393	-41.	LRSI	3081.
155	399	-50.	HRSI	3823.
156	1	23.	LINER	26620.
157	2	13.	LINER	26620.
158	3	10.	LINER	26620.
159	4	19.	LINER	26620.
160	5	22.	LINER	26620.
161	6	13.	LINER	26620.
162	7	10.	LINER	26620.
163	8	20.	LINER	26620.
164	11	-6.	BLKHED	32690.
165	13	-12.	BLKHED	32690.
166	440	10.	LINER	3444.
167	441	1.	LINER	3444.
168	442	5.	LINER	3444.
169	443	14.	LINER	3444.
170	445	9.	LINER	3444.
171	446	1.	LINER	3444.
172	447	5.	LINER	3444.
173	448	14.	LINER	3444.
174	570	100.	FILI	207.
175	571	100.	FILI	207.
176	572	100.	FILI	207.
177	573	100.	FILI	207.
178	580	100.	FILI	207.
179	581	100.	FILI	207.

Figure 8 continued

180	582	100.	FILI	207.
181	583	100.	FILI	207.
182	575	100.	FILO	144.
183	576	100.	FILO	144.
184	577	100.	FILO	144.
185	578	100.	FILO	144.
186	585	100.	FILO	144.
187	586	100.	FILO	144.
188	587	100.	FILO	144.
189	588	100.	FILO	144.

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REPORT NO. 8 *** OFT-3 PREFLIGHT EVAL. *** IECM MASS SPEC (06:40:00-06:55:00)

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CONTENTS: LIST OF MISSION DATA THAT WILL BE USED

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Figure 8 continued

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COSZY = 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
 COSZZ = .1E+01, .1E+01, .1E+01, .1E+01, .1E+01, .1E+01, .1E+01, .1E+01, .1E+01, .1E+01,
 THETA1 = 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
 THETA2 = .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02,
 PHI1 = 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
 PHI2 = .36E+03, .36E+03, .36E+03, .36E+03, .36E+03, .36E+03, .36E+03, .36E+03, .36E+03, .36E+03,
 DOMECA = .1E+00, .1E+00, .1E+00, .1E+00, .1E+00, .1E+00, .1E+00, .1E+00, .1E+00, .1E+00,
 DSRTNF = .25E+01, .5E+01, .5E+01, .5E+01, .5E+01, .5E+01, .5E+01, .5E+01, .5E+01, .5E+01,
 .5E+02, .124E+03, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
 DTHETA = .2048E+02, .2048E+02, .2048E+02, .2048E+02, .2048E+02, .2048E+02, .2048E+02, .2048E+02, .2048E+02, .2048E+02,
 DPHI = .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02, .1024E+02,
 RMAXRF = .3E+03,
 RFSTK = .1E+01, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
 VFACTR = .3E+01,
 TIME00 = 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
 JKEEP = 50,
 X0 = .1088E+04, .1107E+04, .1107E+04, .1107E+04, .1107E+04, .1107E+04, .1107E+04, .1107E+04, .1107E+04, .1107E+04,
 Y0 = .8E+01, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
 Z0 = .473E+03, .507E+03, .507E+03, .507E+03, .507E+03, .507E+03, .507E+03, .507E+03, .507E+03, .507E+03,
 GO = T,
 SEND

Figure 8 continued

CONTENTS: PHYSICAL CHARACTERISTICS OF SURFACE SOURCES AT TIME 6.HRS 40.MINS 0.SECs

SURFACE NUMBER	AREA (IN**2) (CM**2)	SECTION MATERIAL	MASS LOSS (GM/SEC) TEMP (DEG C)	SPECIES MASS LOSS RATES (GM/CM**2/SEC)					EARLY DESORPTION	OUT GASSING
				OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3		
570	.21E+03 .13E+04	FILTER FILI	.186E-02 100.	0. .34E-06	0. 0.	.14E-07 0.	.10E-05 0.	.14E-07 0.	.139E-05	0.
571	.21E+03 .13E+04	FILTER FILI	.186E-02 100.	0. .34E-06	0. 0.	.14E-07 0.	.10E-05 0.	.14E-07 0.	.139E-05	0.
572	.21E+03 .13E+04	FILTER FILI	.186E-02 100.	0. .34E-06	0. 0.	.14E-07 0.	.10E-05 0.	.14E-07 0.	.139E-05	0.
573	.21E+03 .13E+04	FILTER FILI	.186E-02 100.	0. .34E-06	0. 0.	.14E-07 0.	.10E-05 0.	.14E-07 0.	.139E-05	0.
580	.21E+03 .13E+04	FILTER FILI	.186E-02 100.	0. .34E-06	0. 0.	.14E-07 0.	.10E-05 0.	.14E-07 0.	.139E-05	0.
581	.21E+03 .13E+04	FILTER FILI	.186E-02 100.	0. .34E-06	0. 0.	.14E-07 0.	.10E-05 0.	.14E-07 0.	.139E-05	0.
582	.21E+03 .13E+04	FILTER FILI	.186E-02 100.	0. .34E-06	0. 0.	.14E-07 0.	.10E-05 0.	.14E-07 0.	.139E-05	0.
583	.21E+03 .13E+04	FILTER FILI	.186E-02 100.	0. .34E-06	0. 0.	.14E-07 0.	.10E-05 0.	.14E-07 0.	.139E-05	0.
230	.26E+05 .17E+06	FUSLAG LRSI	.350E-03 81.	.27E-09 .18E-09	0. 0.	.78E-09 0.	.49E-09 0.	.39E-09 0.	.184E-08	.267E-09
575	.14E+03 .93E+03	FILTER FILO	.330E-03 100.	0. .82E-07	0. 0.	.36E-08 0.	.27E-06 0.	.36E-08 0.	.356E-06	0.
576	.14E+03 .93E+03	FILTER FILO	.330E-03 100.	0. .82E-07	0. 0.	.36E-08 0.	.27E-06 0.	.36E-08 0.	.356E-06	0.
577	.14E+03 .93E+03	FILTER FILO	.330E-03 100.	0. .82E-07	0. 0.	.36E-08 0.	.27E-06 0.	.36E-08 0.	.356E-06	0.
578	.14E+03 .93E+03	FILTER FILO	.330E-03 100.	0. .82E-07	0. 0.	.36E-08 0.	.27E-06 0.	.36E-08 0.	.356E-06	0.
585	.14E+03 .93E+03	FILTER FILO	.330E-03 100.	0. .82E-07	0. 0.	.36E-08 0.	.27E-06 0.	.36E-08 0.	.356E-06	0.
586	.14E+03 .93E+03	FILTER FILO	.330E-03 100.	0. .82E-07	0. 0.	.36E-08 0.	.27E-06 0.	.36E-08 0.	.356E-06	0.
587	.14E+03 .93E+03	FILTER FILO	.330E-03 100.	0. .82E-07	0. 0.	.36E-08 0.	.27E-06 0.	.36E-08 0.	.356E-06	0.
588	.14E+03 .93E+03	FILTER FILO	.330E-03 100.	0. .82E-07	0. 0.	.36E-08 0.	.27E-06 0.	.36E-08 0.	.356E-06	0.

Figure 8 continued

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241	.16E+05 .11E+06	FUSLAG LRSI	.222E-03 81.	.27E-09 0. .18E-09 0.	.78E-09 0. .49E-09 0.	.39E-09 0.	.184E-08	.267E-09
132	.30E+05 .19E+06	WING NOMEX	.158E-03 28.	.10E-09 0. .73E-10 0.	.31E-09 0. .19E-09 0.	.15E-09 0.	.721E-09	.105E-09
102	.30E+05 .19E+06	WING NOMEX	.157E-03 28.	.10E-09 0. .72E-10 0.	.30E-09 0. .19E-09 0.	.15E-09 0.	.718E-09	.104E-09
240	.16E+05 .11E+06	FUSLAG LRSI	.141E-03 68.	.17E-09 0. .12E-09 0.	.49E-09 0. .31E-09 0.	.25E-09 0.	.117E-08	.169E-09
316	.31E+05 .20E+06	FUSLAG NOMEX	.934E-04 12.	.59E-10 0. .41E-10 0.	.17E-09 0. .11E-09 0.	.87E-10 0.	.409E-09	.593E-10
306	.31E+05 .20E+06	FUSLAG NOMEX	.911E-04 11.	.58E-10 0. .40E-10 0.	.17E-09 0. .11E-09 0.	.85E-10 0.	.398E-09	.578E-10
107	.17E+05 .11E+06	ELEVON NOMEX	.820E-04 25.	.94E-10 0. .65E-10 0.	.27E-09 0. .17E-09 0.	.14E-09 0.	.645E-09	.936E-10
140	.23E+05 .15E+06	WING NOMEX	.792E-04 15.	.67E-10 0. .46E-10 0.	.19E-09 0. .12E-09 0.	.98E-10 0.	.459E-09	.667E-10
110	.23E+05 .15E+06	WING NOMEX	.788E-04 15.	.66E-10 0. .46E-10 0.	.19E-09 0. .12E-09 0.	.97E-10 0.	.457E-09	.664E-10
142	.19E+05 .13E+06	WING NOMEX	.635E-04 14.	.64E-10 0. .45E-10 0.	.19E-09 0. .12E-09 0.	.94E-10 0.	.443E-09	.644E-10
112	.19E+05 .13E+06	WING NOMEX	.631E-04 14.	.64E-10 0. .44E-10 0.	.19E-09 0. .12E-09 0.	.94E-10 0.	.441E-09	.640E-10
137	.91E+04 .59E+05	ELEVON NOMEX	.435E-04 25.	.94E-10 0. .65E-10 0.	.27E-09 0. .17E-09 0.	.14E-09 0.	.645E-09	.936E-10
11	.33E+05 .21E+06	BAY BLKHED	.426E-04 -6.	.26E-10 0. .18E-10 0.	.75E-10 0. .46E-10 0.	.38E-10 0.	.176E-09	.256E-10
260	.20E+05 .13E+06	FUSLAG LRSI	.411E-04 26.	.40E-10 0. .28E-10 0.	.12E-09 0. .73E-10 0.	.58E-10 0.	.275E-09	.398E-10
50	.26E+05 .17E+06	RADOOR TEFLON	.377E-04 17.	.29E-10 0. .20E-10 0.	.84E-10 0. .53E-10 0.	.43E-10 0.	.200E-09	.290E-10
40	.26E+05 .17E+06	RADOOR TEFLON	.377E-04 17.	.29E-10 0. .20E-10 0.	.84E-10 0. .53E-10 0.	.43E-10 0.	.200E-09	.290E-10
134	.91E+04 .59E+05	WING NOMEX	.354E-04 19.	.76E-10 0. .53E-10 0.	.22E-09 0. .14E-09 0.	.11E-09 0.	.525E-09	.762E-10
202	.33E+05 .21E+06	FUSLAG LRSI	.352E-04 8.	.21E-10 0. .15E-10 0.	.62E-10 0. .39E-10 0.	.31E-10 0.	.147E-09	.213E-10
203	.33E+05 .21E+06	FUSLAG LRSI	.352E-04 8.	.21E-10 0. .15E-10 0.	.62E-10 0. .39E-10 0.	.31E-10 0.	.147E-09	.213E-10
104	.91E+04 .59E+05	WING NOMEX	.349E-04 19.	.75E-10 0. .52E-10 0.	.22E-09 0. .14E-09 0.	.11E-09 0.	.518E-09	.752E-10
13	.33E+05 .21E+06	BAY BLKHED	.348E-04 -12.	.21E-10 0. .14E-10 0.	Figure 8 continued 10			.144E-09 .209E-10

136	.65E+04 .42E+05	ELEVON NOMEX	.335E-04 27.	.10E-09 0. .70E-10 0.	.29E-09 0. 0.	.18E-09 0. 0.	.15E-09 0. 0.	.697E-09	.101E-09
106	.65E+04 .42E+05	ELEVON NOMEX	.335E-04 27.	.10E-09 0. .70E-10 0.	.29E-09 0. 0.	.18E-09 0. 0.	.15E-09 0. 0.	.697E-09	.101E-09
44	.26E+05 .17E+06	RADOOR TEFLON	.295E-04 10.	.23E-10 0. .16E-10 0.	.66E-10 0. 0.	.41E-10 0. 0.	.33E-10 0. 0.	.156E-09	.227E-10
54	.26E+05 .17E+06	RADOOR TEFLON	.286E-04 9.	.22E-10 0. .15E-10 0.	.64E-10 0. 0.	.40E-10 0. 0.	.32E-10 0. 0.	.151E-09	.220E-10
307	.25E+05 .16E+06	FUSLAG NOMEX	.277E-04 -17.	.22E-10 0. .15E-10 0.	.64E-10 0. 0.	.40E-10 0. 0.	.32E-10 0. 0.	.152E-09	.220E-10
317	.25E+05 .16E+06	FUSLAG NOMEX	.277E-04 -17.	.22E-10 0. .15E-10 0.	.64E-10 0. 0.	.40E-10 0. 0.	.32E-10 0. 0.	.151E-09	.219E-10
315	.31E+05 .20E+06	FUSLAG LRSI	.232E-04 -3.	.15E-10 0. .10E-10 0.	.43E-10 0. 0.	.27E-10 0. 0.	.22E-10 0. 0.	.102E-09	.148E-10
305	.31E+05 .20E+06	FUSLAG LRSI	.229E-04 -3.	.15E-10 0. .10E-10 0.	.42E-10 0. 0.	.26E-10 0. 0.	.21E-10 0. 0.	.100E-09	.145E-10
64	.38E+05 .24E+06	DMS LRSI	.200E-04 -13.	.10E-10 0. .72E-11 0.	.30E-10 0. 0.	.19E-10 0. 0.	.15E-10 0. 0.	.713E-10	.103E-10
84	.38E+05 .24E+06	DMS LRSI	.199E-04 -13.	.10E-10 0. .72E-11 0.	.30E-10 0. 0.	.19E-10 0. 0.	.15E-10 0. 0.	.712E-10	.103E-10
130	.64E+04 .41E+05	WING NOMEX	.154E-04 5.	.47E-10 0. .33E-10 0.	.14E-09 0. 0.	.86E-10 0. 0.	.70E-10 0. 0.	.327E-09	.474E-10
100	.64E+04 .41E+05	WING NOMEX	.151E-04 5.	.47E-10 0. .32E-10 0.	.14E-09 0. 0.	.85E-10 0. 0.	.69E-10 0. 0.	.322E-09	.458E-10
TOTALS	.78E+06 .50E+07		.197E-01						
AVERAGE				.57E-10 0. .89E-09 0.	.20E-09 0. 0.	.27E-08 0. 0.	.12E-09 0. 0.	.388E-08	.569E-10

Figure 8 continued

ORIGINAL PAGE IS
OF POOR QUALITY

CONTENTS: RETURN FLUX AT 398.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = 100

*** HIGHEST TO LOWEST CONTRIBUTOR ***

SURFACE NUMBER	SECTION MATERIAL	MASS LOSS (GM/SEC) TEMP (DEG C)	SPECIES RETURN FLUX CONTRIBUTION (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (MOLECULES/CM**2)	TOTAL RTN FLX	% OF TOTAL	PLACE
			OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3					
50	140	WING NOMEX	.792E-04 15.280	.44E+07 0. .22E+07 0.	.10E+08 0. 0.	.67E+07 0. 0.	.47E+07 0. 0.	.11E-14 .24E+08	.74E-15 .44E+07	.18E-14 .28E+08	10.5516	1
	110	WING NOMEX	.788E-04 15.140	.43E+07 0. .21E+07 0.	.10E+08 0. 0.	.65E+07 0. 0.	.46E+07 0. 0.	.10E-14 .23E+08	.72E-15 .43E+07	.18E-14 .28E+08	10.2887	2
	11	BAY BLKHED	.426E-04 -6.260	.39E+07 0. .19E+07 0.	.90E+07 0. 0.	.59E+07 0. 0.	.42E+07 0. 0.	.95E-15 .21E+08	.65E-15 .39E+07	.16E-14 .25E+08	9.3524	3
	50	RADOOR TEFLON	.377E-04 17.430	.36E+07 0. .18E+07 0.	.83E+07 0. 0.	.54E+07 0. 0.	.38E+07 0. 0.	.87E-15 .19E+08	.60E-15 .36E+07	.15E-14 .23E+08	8.5566	4
	142	WING NOMEX	.635E-04 14.250	.33E+07 0. .16E+07 0.	.75E+07 0. 0.	.49E+07 0. 0.	.35E+07 0. 0.	.79E-15 .17E+08	.54E-15 .33E+07	.13E-14 .21E+08	7.7285	5
	112	WING NOMEX	.631E-04 14.080	.32E+07 0. .16E+07 0.	.73E+07 0. 0.	.48E+07 0. 0.	.34E+07 0. 0.	.77E-15 .17E+08	.53E-15 .32E+07	.13E-14 .20E+08	7.5740	6
	137	ELEVON NOMEX	.435E-04 25.110	.30E+07 0. .15E+07 0.	.69E+07 0. 0.	.45E+07 0. 0.	.32E+07 0. 0.	.73E-15 .16E+08	.50E-15 .30E+07	.12E-14 .19E+08	7.1258	7
	107	ELEVON NOMEX	.820E-04 25.110	.30E+07 0. .15E+07 0.	.68E+07 0. 0.	.44E+07 0. 0.	.32E+07 0. 0.	.72E-15 .16E+08	.49E-15 .30E+07	.12E-14 .19E+08	7.0453	8
	44	RADOOR TEFLON	.295E-04 10.310	.27E+07 0. .14E+07 0.	.63E+07 0. 0.	.41E+07 0. 0.	.29E+07 0. 0.	.66E-15 .15E+08	.45E-15 .27E+07	.11E-14 .17E+08	6.4922	9
	40	RADOOR TEFLON	.377E-04 17.430	.18E+07 0. .90E+06 0.	.42E+07 0. 0.	.27E+07 0. 0.	.19E+07 0. 0.	.44E-15 .98E+07	.30E-15 .18E+07	.75E-15 .12E+08	4.3376	10
	13	BAY BLKHED	.348E-04 -12.140	.16E+07 0. .78E+06 0.	.36E+07 0. 0.	.24E+07 0. 0.	.17E+07 0. 0.	.38E-15 .84E+07	.26E-15 .16E+07	.64E-15 .10E+08	3.7335	11
	54	RADOOR TEFLON	.286E-04 9.420	.15E+07 0. .74E+06 0.	.34E+07 0. 0.	.22E+07 0. 0.	.16E+07 0. 0.	.36E-15 .80E+07	.25E-15 .15E+07	.61E-15 .95E+07	3.5356	12
	134	WING NOMEX	.354E-04 19.170	.11E+07 0. .55E+06 0.	.26E+07 0. 0.	.17E+07 0. 0.	.12E+07 0. 0.	.27E-15 .60E+07	.19E-15 .11E+07	.46E-15 .71E+07	2.6634	13
	104	WING NOMEX	.349E-04 18.750	.11E+07 0. .54E+06 0.	.25E+07 0. 0.	.16E+07 0. 0.	.12E+07 0. 0.	.27E-15 .59E+07	.18E-15 .11E+07	.45E-15 .70E+07	2.6015	14

Figure 8 continued

CONTENTS: RETURN FLUX AT 398.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = 100

*** HIGHEST TO LOWEST CONTRIBUTOR *** (CONT)

SURFACE NUMBER	SECTION MATERIAL	MASS LOSS (GM/SEC) TEMP (DEG C)	SPECIES RETURN FLUX CONTRIBUTION (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (GM/CM**2)	TOTAL RTN FLX (GM/CM**2)	% OF TOTAL	PLACE
			OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3					
64	OMS LRSI	.200E-04 -13.020	.72E+06 .36E+06	0. 0.	.17E+07 0.	.11E+07 0.	.77E+06 0.	.17E-15 .39E+07	.12E-15 .72E+06	.29E-15 .46E+07	1.7111	15
84	OMS LRSI	.199E-04 -13.040	.70E+06 .35E+06	0. 0.	.16E+07 0.	.11E+07 0.	.75E+06 0.	.17E-15 .38E+07	.12E-15 .70E+06	.29E-15 .45E+07	1.6689	16
136	ELEVON NOMEX	.335E-04 27.360	.69E+06 .34E+06	0. 0.	.16E+07 0.	.10E+07 0.	.73E+06 0.	.17E-15 .37E+07	.11E-15 .69E+06	.28E-15 .44E+07	1.6321	17
106	ELEVON NOMEX	.335E-04 27.360	.65E+06 .32E+06	0. 0.	.15E+07 0.	.98E+06 0.	.69E+06 0.	.16E-15 .35E+07	.11E-15 .65E+06	.27E-15 .41E+07	1.5480	18
102	WING NOMEX	.157E-03 28.220	.19E+06 .92E+05	0. 0.	.43E+06 0.	.28E+06 0.	.20E+06 0.	.45E-16 .99E+06	.31E-16 .19E+06	.76E-16 .12E+07	.4400	19
130	WING NOMEX	.154E-04 5.410	.15E+06 .73E+05	0. 0.	.34E+06 0.	.22E+06 0.	.16E+06 0.	.36E-16 .79E+06	.24E-16 .15E+06	.60E-16 .94E+06	.3496	20
100	WING NOMEX	.151E-04 5.000	.14E+06 .70E+05	0. 0.	.33E+06 0.	.21E+06 0.	.15E+06 0.	.34E-16 .76E+06	.24E-16 .14E+06	.58E-16 .90E+06	.3369	21
305	FUSLAG LRSI	.229E-04 -3.160	.87E+05 .43E+05	0. 0.	.20E+06 0.	.13E+06 0.	.92E+05 0.	.21E-16 .46E+06	.14E-16 .87E+05	.35E-16 .55E+06	.2060	22
316	FUSLAG NOMEX	.934E-04 11.900	.74E+05 .37E+05	0. 0.	.17E+06 0.	.11E+06 0.	.79E+05 0.	.18E-16 .40E+06	.12E-16 .74E+05	.30E-16 .47E+06	.1762	23
306	FUSLAG NOMEX	.911E-04 11.150	.72E+05 .36E+05	0. 0.	.17E+06 0.	.11E+06 0.	.77E+05 0.	.18E-16 .39E+06	.12E-16 .72E+05	.30E-16 .46E+06	.1720	24
315	FUSLAG LRSI	.232E-04 -2.690	.72E+05 .36E+05	0. 0.	.17E+06 0.	.11E+06 0.	.77E+05 0.	.17E-16 .39E+06	.12E-16 .72E+05	.29E-16 .46E+06	.1710	25
317	FUSLAG NOMEX	.277E-04 -16.960	.61E+03 .30E+03	0. 0.	.14E+04 0.	.91E+03 0.	.64E+03 0.	.15E-18 .32E+04	.10E-18 .61E+03	.25E-18 .39E+04	.0014	26
TOTAL		.124E-02	.42E+06 .21E+08	0. 0.	.97E+08 0.	.63E+08 0.	.45E+08 0.	.10E-13 .23E+09	.70E-14 .42E+08	.17E-13 .27E+09	100.0000	

Figure 8 continued

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ORIGINAL PAGE IS
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CONTENTS: RETURN FLUX AT 398.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** SORTED BY TYPE OF MATERIAL ***

SURFACE NUMBER	SECTION MATERIAL	MASS LOSS (GM/SEC) TEMP (DEG C)	SPECIES RETURN FLUX CONTRIBUTIONS (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (GM/CM**2) (MOLECULES/CM**2)	TOTAL RTNFLX
			OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3			
50	RADOOR TEFLON	.377E-04 17.430	.36E+07 .18E+07	0. 0.	.83E+07 0.	.54E+07 0.	.38E+07 0.	.87E-15 .19E+08	.60E-15 .36E+07	.15E-14 .23E+08
44	RADOOR TEFLON	.295E-04 10.310	.27E+07 .14E+07	0. 0.	.63E+07 0.	.41E+07 0.	.29E+07 0.	.66E-15 .15E+08	.45E-15 .27E+07	.11E-14 .17E+08
40	RADOOR TEFLON	.377E-04 17.430	.18E+07 .90E+06	0. 0.	.42E+07 0.	.27E+07 0.	.19E+07 0.	.44E-15 .98E+07	.30E-15 .18E+07	.75E-15 .12E+08
54	RADOOR TEFLON	.286E-04 9.420	.15E+07 .74E+06	0. 0.	.34E+07 0.	.22E+07 0.	.16E+07 0.	.36E-15 .80E+07	.25E-15 .15E+07	.61E-15 .95E+07
TOTAL	TEFLON	.134E-03	.97E+07 .48E+07	0. 0.	.22E+08 0.	.14E+08 0.	.10E+08 0.	.23E-14 .52E+08	.16E-14 .97E+07	.39E-14 .61E+08
140	WING NOMEX	.792E-04 15.280	.44E+07 .22E+07	0. 0.	.10E+08 0.	.67E+07 0.	.47E+07 0.	.11E-14 .24E+08	.74E-15 .44E+07	.18E-14 .28E+08
110	WING NOMEX	.768E-04 15.140	.43E+07 .21E+07	0. 0.	.10E+08 0.	.65E+07 0.	.46E+07 0.	.10E-14 .23E+08	.72E-15 .43E+07	.18E-14 .28E+08
142	WING NOMEX	.635E-04 14.250	.33E+07 .16E+07	0. 0.	.75E+07 0.	.49E+07 0.	.35E+07 0.	.79E-15 .17E+08	.54E-15 .33E+07	.13E-14 .21E+08
112	WING NOMEX	.631E-04 14.080	.32E+07 .16E+07	0. 0.	.73E+07 0.	.48E+07 0.	.34E+07 0.	.77E-15 .17E+08	.53E-15 .32E+07	.13E-14 .20E+08
137	ELEVON NOMEX	.435E-04 25.110	.30E+07 .15E+07	0. 0.	.69E+07 0.	.45E+07 0.	.32E+07 0.	.73E-15 .16E+08	.50E-15 .30E+07	.12E-14 .19E+08
107	ELEVON NOMEX	.820E-04 25.110	.30E+07 .15E+07	0. 0.	.68E+07 0.	.44E+07 0.	.32E+07 0.	.72E-15 .16E+08	.49E-15 .30E+07	.12E-14 .19E+08
134	WING NOMEX	.354E-04 19.170	.11E+07 .55E+06	0. 0.	.26E+07 0.	.17E+07 0.	.12E+07 0.	.27E-15 .60E+07	.19E-15 .11E+07	.46E-15 .71E+07
104	WING NOMEX	.349E-04 18.750	.11E+07 .54E+06	0. 0.	.25E+07 0.	.16E+07 0.	.12E+07 0.	.27E-15 .59E+07	.18E-15 .11E+07	.45E-15 .70E+07
136	ELEVON NOMEX	.335E-04 27.360	.69E+06 .34E+06	0. 0.	.16E+07 0.	.10E+07 0.	.73E+06 0.	.17E-15 .37E+07	.11E-15 .69E+06	.28E-15 .44E+07

Figure 8 continued

CONTENTS: RETURN FLUX AT 398.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** SORTED BY TYPE OF MATERIAL *** (CONT)

SURFACE NUMBER	SECTION MATERIAL	MASS LOSS (GM/SEC) TEMP (DEG C)	SPECIES RETURN FLUX CONTRIBUTIONS (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (GM/CM**2)	TOTAL RTN FLX
			OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3			
106	ELEVON NOMEX	.335E-04 27.360	.65E+06 .32E+06	0. 0.	.15E+07 0.	.98E+06 0.	.69E+06 0.	.16E-15 .35E+07	.11E-15 .65E+06	.27E-15 .41E+07
102	WING NOMEX	.157E-03 28.220	.19E+06 .92E+05	0. 0.	.43E+06 0.	.28E+06 0.	.20E+06 0.	.45E-16 .99E+06	.31E-16 .19E+06	.76E-16 .12E+07
130	WING NOMEX	.154E-04 5.410	.15E+06 .73E+05	0. 0.	.34E+06 0.	.22E+06 0.	.16E+06 0.	.36E-16 .79E+06	.24E-16 .15E+06	.60E-16 .94E+06
100	WING NOMEX	.151E-04 5.000	.14E+06 .70E+05	0. 0.	.33E+06 0.	.21E+06 0.	.15E+06 0.	.34E-16 .76E+06	.24E-16 .14E+06	.58E-16 .90E+06
316	FUSLAG NOMEX	.934E-04 11.900	.74E+05 .37E+05	0. 0.	.17E+06 0.	.11E+06 0.	.79E+05 0.	.18E-16 .40E+06	.12E-16 .74E+05	.30E-16 .47E+06
306	FUSLAG NOMEX	.911E-04 11.150	.72E+05 .36E+05	0. 0.	.17E+06 0.	.11E+06 0.	.77E+05 0.	.18E-16 .39E+06	.12E-16 .72E+05	.30E-16 .46E+06
317	FUSLAG NOMEX	.277E-04 -16.960	.61E+03 .30E+03	0. 0.	.14E+04 0.	.91E+03 0.	.64E+03 0.	.15E-18 .32E+04	.10E-18 .61E+03	.25E-18 .39E+04
TOTAL	NOMEX	.947E-03	.25E+08 .13E+08	0. 0.	.58E+08 0.	.38E+08 0.	.27E+08 0.	.61E-14 .14E+09	.42E-14 .25E+08	.10E-13 .16E+09
64	DMS LRSI	.200E-04 -13.020	.72E+06 .36E+06	0. 0.	.17E+07 0.	.11E+07 0.	.77E+06 0.	.17E-15 .39E+07	.12E-15 .72E+06	.29E-15 .46E+07
84	DMS LRSI	.199E-04 -13.040	.70E+06 .35E+06	0. 0.	.16E+07 0.	.11E+07 0.	.75E+06 0.	.17E-15 .38E+07	.12E-15 .70E+06	.29E-15 .45E+07
305	FUSLAG LRSI	.229E-04 -3.160	.87E+05 .43E+05	0. 0.	.20E+06 0.	.13E+06 0.	.92E+05 0.	.21E-16 .46E+06	.14E-16 .87E+05	.35E-16 .55E+06
315	FUSLAG LRSI	.232E-04 -2.690	.72E+05 .36E+05	0. 0.	.17E+06 0.	.11E+06 0.	.77E+05 0.	.17E-16 .39E+06	.12E-16 .72E+05	.29E-16 .46E+06
TOTAL	LRSI	.859E-04	.16E+07 .78E+06	0. 0.	.36E+07 0.	.24E+07 0.	.17E+07 0.	.38E-15 .85E+07	.26E-15 .16E+07	.65E-15 .10E+08
11	BAY BLKHED	.426E-04 -6.260	.39E+07 .19E+07	0. 0.	.90E+07 0.	.59E+07 0.	.42E+07 0.	.95E-15 .21E+08	.65E-15 .39E+07	.16E-14 .25E+08

Figure 8 continued

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REPORT NO. 42 *** OFT-3 PREFLIGHT EVAL. *** IECM MASS SPEC (06:40:00-06:55:00)

01/26/78 09.01.25. PAGE 10

CONTENTS: RETURN FLUX AT 398.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** SORTED BY TYPE OF MATERIAL *** (CONT)

SURFACE NUMBER	SECTION	MASS LOSS	SPECIES RETURN FLUX CONTRIBUTIONS						EARLY	OUT	TOTAL	
	MATERIAL	(GM/SEC)	(MOLECULES/CM**2)						DESORPTION	GASSING		RTNFLX
		TEMP	OUTG1	OUTG2	H2O	N2	CO2	(GM/CM**2)	(MOLECULES/CM**2)			
		(DEG C)	O2	CO	H2	H	MMHNO3					
13	BAY	.348E-04	.16E+07	0.	.35E+07	.24E+07	.17E+07	.39E-15	.26E-15	.64E-15		
	BLKHED	-12.140	.78E+06	0.	0.	0.	0.	.84E+07	.16E+07	.10E+08		
TOTAL	BLKHED	.774E-04	.55E+07	0.	.13E+08	.83E+07	.59E+07	.13E-14	.92E-15	.23E-14		
			.27E+07	0.	0.	0.	0.	.30E+08	.55E+07	.35E+08		

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Figure 8 continued

CONTENTS: SUMMARY RETURN FLUX AT 398.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
TEFLON	.97E+07	0.	.22E+08	.14E+08	.10E+08	.23E-14	.16E-14	.39E-14	
	.48E+07	0.	0.	0.	0.	.52E+08	.97E+07	.61E+08	22.9
NOMEX	.25E+08	0.	.58E+08	.38E+08	.27E+08	.61E-14	.42E-14	.10E-13	
	.13E+08	0.	0.	0.	0.	.14E+09	.25E+08	.16E+09	60.2
LRSI	.16E+07	0.	.36E+07	.24E+07	.17E+07	.38E-15	.26E-15	.65E-15	
	.78E+06	0.	0.	0.	0.	.85E+07	.16E+07	.10E+08	3.8
BLKHED	.55E+07	0.	.13E+08	.83E+07	.59E+07	.13E-14	.92E-15	.23E-14	
	.27E+07	0.	0.	0.	0.	.30E+08	.55E+07	.35E+08	13.1
TOTAL	.42E+08	0.	.97E+08	.63E+08	.45E+08	.10E-13	.70E-14	.17E-13	
	.21E+08	0.	0.	0.	0.	.23E+09	.42E+08	.27E+09	100.0

Figure 8 concluded

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
TEFLON	.11E+07	0.	.26E+07	.17E+07	.12E+07	.27E-15	.19E-15	.46E-15	
	.56E+06	0.	0.	0.	0.	.61E+07	.11E+07	.72E+07	38.1
NOMEX	.17E+05	0.	.39E+05	.26E+05	.18E+05	.41E-17	.29E-17	.70E-17	
	.85E+04	0.	0.	0.	0.	.92E+05	.17E+05	.11E+06	.6
LRS1	.10E+07	0.	.23E+07	.15E+07	.11E+07	.25E-15	.17E-15	.42E-15	
	.50E+06	0.	0.	0.	0.	.54E+07	.10E+07	.65E+07	34.2
BLKHED	.82E+06	0.	.19E+07	.12E+07	.86E+06	.20E-15	.14E-15	.33E-15	
	.40E+06	0.	0.	0.	0.	.43E+07	.82E+06	.51E+07	27.2
TOTAL	.30E+07	0.	.68E+07	.45E+07	.32E+07	.72E-15	.50E-15	.12E-14	
	.15E+07	0.	0.	0.	0.	.16E+08	.30E+07	.19E+08	100.0

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Figure 9 Summary Predictions for OFT-3 Time Intervals Analyzed

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = 100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (GM/CM**2) (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3				
TEFLON	.32E+07	0.	.72E+07	.47E+07	.33E+07	.76E-15	.54E-15	.13E-14	
	.16E+07	0.	0.	0.	0.	.17E+08	.32E+07	.20E+08	48.8
NOMEX	.23E+07	0.	.51E+07	.34E+07	.24E+07	.54E-15	.38E-15	.92E-15	
	.11E+07	0.	0.	0.	0.	.12E+08	.23E+07	.14E+08	34.8
LRSI	.12E+06	0.	.26E+06	.17E+06	.12E+06	.27E-16	.19E-16	.47E-16	
	.56E+05	0.	0.	0.	0.	.60E+06	.12E+06	.72E+06	1.8
BLKHED	.97E+06	0.	.22E+07	.14E+07	.10E+07	.23E-15	.16E-15	.39E-15	
	.47E+06	0.	0.	0.	0.	.50E+07	.97E+06	.60E+07	14.7
TOTAL	.66E+07	0.	.15E+08	.96E+07	.68E+07	.16E-14	.11E-14	.27E-14	
	.32E+07	0.	0.	0.	0.	.34E+08	.66E+07	.41E+08	100.0

Figure 9 continued

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CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
TEFLON	.90E+07	0.	.20E+08	.13E+08	.92E+07	.21E-14	.15E-14	.36E-14	23.0
	.42E+07	0.	0.	0.	0.	.46E+08	.90E+07	.55E+08	
NOMEX	.24E+08	0.	.53E+08	.34E+08	.24E+08	.56E-14	.40E-14	.95E-14	61.3
	.11E+08	0.	0.	0.	0.	.12E+09	.24E+08	.15E+09	
LRSI	.16E+07	0.	.34E+07	.22E+07	.16E+07	.36E-15	.26E-15	.62E-15	4.0
	.74E+06	0.	0.	0.	0.	.80E+07	.16E+07	.96E+07	
BLKHED	.46E+07	0.	.10E+08	.65E+07	.46E+07	.11E-14	.76E-15	.18E-14	11.7
	.22E+07	0.	0.	0.	0.	.23E+08	.46E+07	.28E+08	
TOTAL	.39E+08	0.	.86E+08	.56E+08	.40E+08	.91E-14	.65E-14	.16E-13	100.0
	.18E+08	0.	0.	0.	0.	.20E+09	.39E+08	.24E+09	

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Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
LINER	.11E+08	0.	.23E+08	.15E+08	.11E+08	.24E-14	.18E-14	.42E-14	
	.50E+07	0.	0.	0.	0.	.53E+08	.11E+08	.64E+08	9.0
TEFLON	.15E+08	0.	.33E+08	.21E+08	.1E+08	.35E-14	.25E-14	.60E-14	
	.70E+07	0.	0.	0.	0.	.76E+08	.15E+08	.92E+08	12.6
NOMEX	.70E+08	0.	.15E+09	.10E+09	.71E+08	.16E-13	.12E-13	.28E-13	
	.33E+08	0.	0.	0.	0.	.36E+09	.70E+08	.43E+09	59.8
LRSI	.58E+07	0.	.13E+08	.83E+07	.59E+07	.13E-14	.97E-15	.23E-14	
	.27E+07	0.	0.	0.	0.	.30E+08	.58E+07	.35E+08	5.0
BLKHED	.16E+08	0.	.34E+08	.22E+08	.16E+08	.36E-14	.26E-14	.62E-14	
	.74E+07	0.	0.	0.	0.	.80E+08	.16E+08	.96E+08	13.5
TOTAL	.12E+09	0.	.26E+09	.17E+09	.12E+09	.27E-13	.20E-13	.46E-13	
	.55E+08	0.	0.	0.	0.	.59E+09	.12E+09	.71E+09	100.0

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Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (MOLECULES/CM**2)	TOTAL	% OF TOTAL	
	OUTG1		OUTG2	H2O	N2					CO2
	O2	CO	H2	H	MMHNO3					
TEFLON	.90E+07	0.	.19E+08	.13E+08	.89E+07	.20E-14	.15E-14	.35E-14	23.0	
NOMEX	.41E+07	0.	0.	0.	0.	.45E+08	.90E+07	.54E+08		
	.24E+08	0.	.51E+08	.33E+08	.24E+08	.54E-14	.40E-14	.94E-14		
LRSI	.11E+08	0.	0.	0.	0.	.12E+09	.24E+08	.14E+09	61.3	
	.16E+07	0.	.33E+07	.22E+07	.16E+07	.35E-15	.26E-15	.61E-15		
BLKHED	.72E+06	0.	0.	0.	0.	.78E+07	.16E+07	.94E+07	4.0	
	.46E+07	0.	.98E+07	.64E+07	.45E+07	.10E-14	.76E-15	.18E-14		
		.21E+07	0.	0.	0.	0.	.23E+08	.46E+07	.27E+08	11.7
TOTAL	.39E+08	0.	.84E+08	.55E+08	.39E+08	.88E-14	.65E-14	.15E-13		
	.18E+08	0.	0.	0.	0.	.19E+09	.39E+08	.23E+09	100.0	

Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
TEFLON	.90E+07	0.	.16E+08	.10E+08	.73E+07	.17E-14	.15E-14	.31E-14	23.0
	.34E+07	0.	0.	0.	0.	.37E+08	.90E+07	.46E+08	
NOMEX	.24E+08	0.	.42E+08	.27E+08	.19E+08	.44E-14	.40E-14	.84E-14	61.3
	.90E+07	0.	0.	0.	0.	.98E+08	.24E+08	.12E+09	
LRSI	.16E+07	0.	.27E+07	.18E+07	.13E+07	.29E-15	.26E-15	.55E-15	4.0
	.59E+06	0.	0.	0.	0.	.64E+07	.16E+07	.79E+07	
BLKHED	.45E+07	0.	.80E+07	.52E+07	.37E+07	.84E-15	.76E-15	.16E-14	11.7
	.17E+07	0.	0.	0.	0.	.19E+08	.45E+07	.23E+08	
TOTAL	.39E+08	0.	.69E+08	.45E+08	.32E+08	.72E-14	.65E-14	.14E-13	100.0
	.15E+08	0.	0.	0.	0.	.16E+09	.39E+08	.20E+09	

Figure 9 continued

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CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3				
TEFLON	.90E+07	0.	.16E+08	.10E+08	.72E+07	.16E-14	.15E-14	.31E-14	23.0
	.34E+07	0.	0.	0.	0.	.36E+08	.90E+07	.45E+08	
NDMEX	.24E+08	0.	.42E+08	.27E+08	.19E+08	.44E-14	.40E-14	.84E-14	61.3
	.90E+07	0.	0.	0.	0.	.97E+08	.24E+08	.12E+09	
LRSI	.16E+07	0.	.27E+07	.18E+07	.13E+07	.29E-15	.26E-15	.55E-15	4.0
	.58E+06	0.	0.	0.	0.	.63E+07	.16E+07	.79E+07	
BLKHED	.45E+07	0.	.79E+07	.52E+07	.37E+07	.84E-15	.76E-15	.16E-14	11.7
	.17E+07	0.	0.	0.	0.	.18E+08	.45E+07	.23E+08	
TOTAL	.39E+08	0.	.68E+08	.44E+08	.31E+08	.72E-14	.65E-14	.14E-13	100.0
	.15E+08	0.	0.	0.	0.	.16E+09	.39E+08	.20E+09	

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Figure 9 continued

CONTENTS: RETURN FLUX AT 400.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** HIGHEST TO LOWEST CONTRIBUTOR ***

ENG/VENT NUMBER	TYPE	LOCATION	SPECIES RETURN FLUX CONTRIBUTION (MOLECULES/CM**2)					TOTAL RTN FLX (GM/CM**2/SEC) (MOLECULES/CM**2/SEC)	% OF TOTAL	PLACE
			OUTG1	OUTG2	H2O	N2	CO2			
			O2	CO	H2	H	MMHND3			
7345	RCS	ARU +Z	0.	0.	.23E+16	.27E+16	.36E+15	.28E-06	99.9765	1
			.53E+13	.12E+16	.12E+16	.11E+15	.88E+13	.79E+16		
7246	RCS	ALD -Z	0.	0.	.53E+12	.64E+12	.84E+11	.66E-10	.0235	2
			.12E+10	.27E+12	.29E+12	.27E+11	.21E+10	.18E+13		
TOTAL			0.	0.	.23E+16	.27E+16	.36E+15	.28E-06	100.00	
			.53E+13	.12E+16	.12E+16	.11E+15	.88E+13	.79E+16		

Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
TEFLON	.90E+07	0.	.16E+08	.10E+08	.72E+07	.16E-14	.15E-14	.31E-14	
	.34E+07	0.	0.	0.	0.	.36E+08	.90E+07	.45E+08	23.0
NOMEX	.24E+08	0.	.42E+08	.27E+08	.19E+08	.44E-14	.40E-14	.84E-14	
	.89E+07	0.	0.	0.	0.	.97E+08	.24E+08	.12E+09	61.3
LRSI	.16E+07	0.	.27E+07	.18E+07	.13E+07	.29E-15	.26E-15	.55E-15	
	.58E+06	0.	0.	0.	0.	.63E+07	.16E+07	.79E+07	4.0
BLKHED	.45E+07	0.	.79E+07	.52E+07	.37E+07	.83E-15	.76E-15	.16E-14	
	.17E+07	0.	0.	0.	0.	.18E+08	.45E+07	.23E+08	11.7
TOTAL	.39E+08	0.	.68E+08	.44E+08	.31E+08	.72E-14	.65E-14	.14E-13	
	.15E+08	0.	0.	0.	0.	.16E+09	.39E+08	.20E+09	100.0

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Figure 9 continued

CONTENTS: RETURN FLUX AT 400.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** HIGHEST TO LOWEST CONTRIBUTOR ***

ENG/VENT NUMBER	TYPE	LOCATION	SPECIES RETURN FLUX CONTRIBUTION (MOLECULES/CM**2)					TOTAL RTN FLX (GM/CM**2/SEC) (MOLECULES/CM**2/SEC)	% OF TOTAL	PLACE
			OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3			
7245	RCS	ALU +Z	0. .37E+15	0. .83E+17	.16E+18 .87E+17	.19E+18 .81E+16	.25E+17 .62E+15	.20E-04 .56E+18	49.6058	1
7345	RCS	ARU +Z	0. .37E+15	0. .83E+17	.16E+18 .87E+17	.19E+18 .81E+16	.25E+17 .62E+15	.20E-04 .56E+18	49.6058	2
7116	RCS	FLD -Z	0. .10E+13	0. .22E+15	.43E+15 .23E+15	.52E+15 .22E+14	.68E+14 .17E+13	.53E-07 .15E+16	.1333	3
7126	RCS	FLD -Z	0. .10E+13	0. .22E+15	.43E+15 .23E+15	.52E+15 .22E+14	.68E+14 .17E+13	.53E-07 .15E+16	.1333	4
TOTAL			0. .75E+15	0. .17E+18	.32E+18 .18E+18	.39E+18 .16E+17	.51E+17 .13E+16	.40E-04 .11E+19	100.00	

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Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (GM/CM**2) (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
TEFLON	.64E+09	0.	.11E+10	.72E+09	.51E+09	.12E-12	.11E-12	.22E-12	
	.24E+09	0.	0.	0.	0.	.26E+10	.64E+09	.32E+10	23.0
NOMEX	.17E+10	0.	.30E+10	.19E+10	.14E+10	.31E-12	.28E-12	.59E-12	
	.63E+09	0.	0.	0.	0.	.69E+10	.17E+10	.86E+10	61.3
LRS1	.11E+09	0.	.19E+09	.13E+09	.89E+08	.20E-13	.18E-13	.39E-13	
	.41E+08	0.	0.	0.	0.	.45E+09	.11E+09	.56E+09	4.0
BLKHED	.32E+09	0.	.56E+09	.37E+09	.26E+09	.59E-13	.54E-13	.11E-12	
	.12E+09	0.	0.	0.	0.	.13E+10	.32E+09	.16E+10	11.7
TOTAL	.28E+10	0.	.48E+10	.31E+10	.22E+10	.51E-12	.46E-12	.97E-12	
	.10E+10	0.	0.	0.	0.	.11E+11	.28E+10	.14E+11	100.0

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Figure 9 continued

CONTENTS: RETURN FLUX AT 400.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** HIGHEST TO LOWEST CONTRIBUTOR ***

ENG/VENT NUMBER	TYPE	LOCATION	SPECIES RETURN FLUX CONTRIBUTION (MOLECULES/CM**2)					TOTAL RTN FLX (GM/CM**2/SEC) (MOLECULES/CM**2/SEC)	% OF TOTAL	PLACE
			OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3			
7245	RCS	ALU +Z	0. .53E+13	0. .12E+16	.23E+16 .12E+16	.27E+16 .11E+15	.36E+15 .88E+13	.28E-06 .79E+16	49.6058	1
7345	RCS	ARU +Z	0. .53E+13	0. .12E+16	.23E+16 .12E+16	.27E+16 .11E+15	.36E+15 .88E+13	.28E-06 .79E+16	49.6058	2
TOTAL			0. .11E+14	0. .24E+16	.45E+16 .25E+16	.55E+16 .23E+15	.72E+15 .18E+14	.57E-06 .16E+17	100.00	

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Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT: GASGING (GM/CM**2)	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
TEFLON	.90E+07	0.	.16E+08	.10E+08	.72E+07	.16E-14	.15E-14	.31E-14	
	.33E+07	0.	0.	0.	0.	.36E+08	.90E+07	.45E+08	23.0
NOMEX	.24E+08	0.	.42E+08	.27E+08	.19E+08	.44E-14	.40E-14	.83E-14	
	.89E+07	0.	0.	0.	0.	.97E+08	.24E+08	.12E+09	61.3
LRSI	.16E+07	0.	.27E+07	.18E+07	.13E+07	.29E-15	.26E-15	.54E-15	
	.58E+06	0.	0.	0.	0.	.63E+07	.16E+07	.79E+07	4.0
BLKHED	.45E+07	0.	.79E+07	.52E+07	.37E+07	.83E-15	.76E-15	.16E-14	
	.17E+07	0.	0.	0.	0.	.18E+08	.45E+07	.23E+08	11.7
TOTAL	.39E+08	0.	.68E+08	.44E+08	.31E+08	.71E-14	.65E-14	.14E-13	
	.15E+08	0.	0.	0.	0.	.16E+09	.39E+08	.20E+09	100.0

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Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (GM/CM**2) (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2D	N2	CO2				
	O2	CO	H2	H	MMHND3				
TEFLON	.89E+07	0.	.41E+07	.27E+07	.19E+07	.43E-15	.15E-14	.19E-14	
	.88E+06	0.	0.	0.	0.	.95E+07	.89E+07	.18E+08	23.0
NOMEX	.24E+08	0.	.11E+08	.71E+07	.50E+07	.11E-14	.39E-14	.51E-14	
	.23E+07	0.	0.	0.	0.	.25E+08	.24E+08	.49E+08	61.3
LRSI	.16E+07	0.	.71E+06	.46E+06	.33E+06	.75E-16	.26E-15	.33E-15	
	.15E+06	0.	0.	0.	0.	.17E+07	.16E+07	.32E+07	4.0
BLKHED	.45E+07	0.	.21E+07	.13E+07	.96E+06	.22E-15	.75E-15	.97E-15	
	.44E+06	0.	0.	0.	0.	.48E+07	.45E+07	.93E+07	11.7
TOTAL	.39E+08	0.	.18E+08	.12E+08	.82E+07	.19E-14	.64E-14	.83E-14	
	.38E+07	0.	0.	0.	0.	.41E+08	.39E+08	.80E+08	100.0

Figure 9 continued

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CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING	TOTAL	% OF TOTAL
	OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3				
LINER	.11E+08	0.	.24E+07	.16E+07	.11E+07	.26E-15	.18E-14	.20E-14	
	.53E+06	0.	0.	0.	0.	.57E+07	.11E+08	.16E+08	9.0
TEFLON	.15E+08	0.	.35E+07	.23E+07	.16E+07	.37E-15	.25E-14	.28E-14	
	.75E+06	0.	0.	0.	0.	.81E+07	.15E+08	.23E+08	12.8
NOMEX	.70E+08	0.	.16E+08	.11E+08	.75E+07	.17E-14	.12E-13	.13E-13	
	.35E+07	0.	0.	0.	0.	.38E+08	.70E+08	.11E+09	59.7
LRSI	.58E+07	0.	.13E+07	.88E+06	.62E+06	.14E-15	.96E-15	.11E-14	
	.29E+06	0.	0.	0.	0.	.31E+07	.58E+07	.89E+07	5.0
BLKHED	.16E+08	0.	.37E+07	.24E+07	.17E+07	.39E-15	.26E-14	.30E-14	
	.79E+06	0.	0.	0.	0.	.85E+07	.16E+08	.24E+08	13.4
TOTAL	.12E+09	0.	.27E+08	.18E+08	.13E+08	.29E-14	.19E-13	.22E-13	
	.58E+07	0.	0.	0.	0.	.63E+08	.12E+09	.18E+09	100.0

Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING	TOTAL	% OF TOTAL
	OUTG1	OUTG2	H2O	N2	CO2				
	O2	CO	H2	H	MMHNO3				
TEFLON	.32E+07	0.	.39E+06	.25E+06	.18E+06	.41E-16	.53E-15	.57E-15	
NOMEX	.84E+05	0.	0.	0.	0.	.91E+06	.32E+07	.41E+07	48.8
	.23E+07	0.	.28E+06	.18E+06	.13E+06	.29E-16	.38E-15	.41E-15	
LRSI	.60E+05	0.	0.	0.	0.	.65E+06	.23E+07	.29E+07	34.8
	.11E+06	0.	.14E+05	.92E+04	.65E+04	.15E-17	.19E-16	.20E-16	
BLKHED	.30E+04	0.	0.	0.	0.	.33E+05	.11E+06	.15E+06	1.8
	.96E+06	0.	.12E+06	.76E+05	.54E+05	.12E-16	.16E-15	.17E-15	
	.25E+05	0.	0.	0.	0.	.27E+06	.96E+06	.12E+07	14.7
TOTAL	.65E+07	0.	.80E+06	.52E+06	.37E+06	.84E-16	.11E-14	.12E-14	
	.17E+06	0.	0.	0.	0.	.19E+07	.65E+07	.84E+07	100.0

Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)					EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3				
TEFLON	.11E+07	0.	.11E+05	.70E+04	.50E+04	.11E-17	.19E-15	.19E-15	
	.23E+04	0.	0.	0.	0.	.25E+05	.11E+07	.11E+07	38.1
NOMEX	.17E+05	0.	.16E+03	.11E+03	.75E+02	.17E-19	.28E-17	.28E-17	
	.35E+02	0.	0.	0.	0.	.38E+03	.17E+05	.17E+05	.6
LRSI	.10E+07	0.	.97E+04	.63E+04	.45E+04	.10E-17	.17E-15	.17E-15	
	.21E+04	0.	0.	0.	0.	.23E+05	.10E+07	.10E+07	34.2
BLKHED	.80E+06	0.	.77E+04	.50E+04	.36E+04	.81E-18	.13E-15	.13E-15	
	.17E+04	0.	0.	0.	0.	.18E+05	.80E+06	.82E+06	27.2
TOTAL	.29E+07	0.	.28E+05	.18E+05	.13E+05	.30E-17	.49E-15	.49E-15	
	.61E+04	0.	0.	0.	0.	.66E+05	.29E+07	.30E+07	100.0

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Figure 9 continued

CONTENTS: SUMMARY RETURN FLUX AT 400.0 KM ALTITUDE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** LISTED BY MATERIAL TYPE *** (CONT)

SECTION SUMMARY	SPECIES RETURN FLUX (MOLECULES/CM**2)						EARLY DESORPTION (GM/CM**2) (MOLECULES/CM**2)	OUT GASSING (GM/CM**2) (MOLECULES/CM**2)	TOTAL	% OF TOTAL
	OUTG1 O2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3					
TEFLON	.86E+07	0.	.36E+04	.23E+04	.17E+04		.38E-18	.14E-14	.14E-14	
	.77E+03	0.	0.	0.	0.		.84E+04	.86E+07	.86E+07	23.0
NOMEX	.23E+08	0.	.96E+04	.62E+04	.44E+04		.10E-17	.38E-14	.38E-14	
	.21E+04	0.	0.	0.	0.		.22E+05	.23E+08	.23E+08	61.4
LRSI	.15E+07	0.	.62E+03	.41E+03	.29E+03		.66E-19	.25E-15	.25E-15	
	.13E+03	0.	0.	0.	0.		.15E+04	.15E+07	.15E+07	4.0
BLKHED	.44E+07	0.	.18E+04	.12E+04	.84E+03		.19E-18	.73E-15	.73E-15	
	.39E+03	0.	0.	0.	0.		.42E+04	.44E+07	.44E+07	11.7
TOTAL	.38E+08	0.	.16E+05	.10E+05	.72E+04		.16E-17	.62E-14	.62E-14	
	.34E+04	0.	0.	0.	0.		.36E+05	.38E+08	.38E+08	100.0

Figure 9 continued

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CONTENTS: RETURN FLUX AT 400.0 KM ALTITUDE - ENUMERATED BY SOURCE

CRITICAL SURFACE NO. = 1000
FIELD-OF-VIEW (SR) = .100

*** HIGHEST TO LOWEST CONTRIBUTOR ***

ENG/VENT NUMBER	TYPE	LOCATION	SPECIES RETURN FLUX CONTRIBUTION (MOLECULES/CM**2)						TOTAL RTN FLX (GM/CM**2/SEC) (MOLECULES/CM**2/SEC)	% OF TOTAL	PLACE
			OUTG1 C2	OUTG2 CO	H2O H2	N2 H	CO2 MMHNO3				
9000	OMS	ARA +X	0. .59E+12	0. .13E+15	.25E+15 .14E+15	.31E+15 .13E+14	.40E+14 .99E+12	.32E-07 .89E+15		100.0000	1
TOTAL			0. .59E+12	0. .13E+15	.25E+15 .14E+15	.31E+15 .13E+14	.40E+14 .99E+12	.32E-07 .89E+15		100.00	

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Figure 9 continued

4.0 RECOMMENDATIONS

The following items are recommendations that are considered desirable in further development of mission analysis capability for the SPACE program. Some of these recommendations pertain specifically to the continued development of a mission profile model while others are model improvements in resolution and output format. The recommendations are listed approximately in order of importance or desirability.

a) Surface-to-surface deposition routines that utilize surface to surface viewfactors to determine incident flux, condensation coefficients and resulting deposition are desirable. Previously, model development has been oriented towards calculating those parameters related to contamination control criteria in the form of return flux and molecular number column densities. However, mission analysis will require surface to surface deposition for payloads while in the bay, during deployment and rendezvous situations.

b) Additional lines-of-sight (total of 8) at 82.5° off of the Z axis should be input to improve the resolution and ability of moving lines-of-sight for column densities and return flux calculations. Viewfactor sets between all sources and the points along these lines-of-sight would be calculated and included as permanent files in the SPACE program.

c) For all lines-of-sight it would be desirable to include more points for density calculations near the vehicle. Currently the spacing is 5 meters and should be reduced to 1 or 2.5 meter spacing. This will allow a higher degree of accuracy and resolution for flight analysis parameters in the form of column densities and return flux.

d) The return flux condensation coefficients should be updated over the current scheme in the SPACE program. Currently, arbitrary values are input. Because of the large range of temperature variations that will exist for all Shuttle Orbiter flights and payload combinations, a systematic approach should be developed. Even though the contaminant molecules may be returned to Orbiter/Payload surfaces at velocities greater than thermal velocities there still should exist a source/collector temperature relation in determining condensation coefficients. It is recommended a $\frac{T_{\text{source}} - T_{\text{collector}}}{\text{Constant}}$ should be developed for return flux sources

and surfaces impinged upon. The main assumption here is that return flux molecules have the same surface accommodation coefficient as molecules at thermal velocities with no interactions with the ambient.

e) The SPACE model should have incorporated into it a geometry of the elevon in an up position, that can be called as input for mission analysis. This will become important for mission analysis where column densities and return flux of the evaporator and engines must be reduced.

f) The Induced Environment Contamination Monitor (IECM) should be input to the model along with a proposed noble gas purge system that will be used to monitor return flux at the mass spectrometer on the IECM. This analysis will be used to confirm and/or update the model routines.

g) The resolution of Orbiter surfaces should be increased for situations where sensors viewing the orbiter may see only a portion of a large surface node in the model. The areas of concern are the radiator surfaces, payload bay liner surfaces and wing surfaces. Viewfactors for these new surfaces would be calculated for all 25 proposed lines-of-sight and input to the SPACE

program as permanent change or an optional file to be used only when a higher degree of resolution is required.

h) Mission profile development should be continued in light of the OFT 3 simulation performed during the present study effort. A review should be made of major contamination events for the initial Shuttle Orbiter flights and the types of payloads so that appropriate parameters can be calculated with sufficient time resolution to meet mission support requirements. Specific pre-flight, real time and postflight contamination analysis should be established to support the mission profile modeling direction.

i) The capability to 3 dimensional plot density and flux values around the Shuttle Orbiter would be desirable. This could be accomplished by utilizing a display computer program that is currently available at JSC. This would allow visual inspection and interpretation of literally thousands of calculations. Trends and effects could be more easily recognized with the use of this plot capability.

j) Since the SPACE model is becoming more complex as requirements are placed upon it and capability is increased, an effort to streamline or reduce run time should be initiated and continued during development and implementation of changes and application to unique problem areas.

APPENDIX A

THERMAL MAPPER CONVERSION PROGRAM

APPENDIX A

THERMAL MAPPER CONVERSION PROGRAM

1. NODE MAPPER

The node mapper portion of the program is contained in unit 14. Figure A-1 shows the data contained in this unit. The first column designates the contamination node number, the second column the percentage of the node that is represented by a thermal node, the third column designates the thermal model used for correlation and finally, the fourth column designates the node in the thermal program that was used. J refers to the JSC mid fuselage thermal model, RA refers to the Rockwell aft section model and RF to the Rockwell forward section model.

2. CONVERSION PROGRAM

Figure A-2 is a listing of the actual conversion program that utilizes the unit 14 input and SINDA tape input.

Figure A-1
Node Mapper Data

A-3

1	.22	J	2579	52	.50	J	2317	97	.78	RA	6017
1	.22	J	2589	54	.50	J	2377	100	1.00	J	1001
1	.28	J	2659	54	.50	J	2387	102	1.00	J	1001
1	.09	J	2669	56	.50	J	2357	104	.66	RA	751
1	.19	J	2809	56	.50	J	2367	104	.34	RA	753
2	.22	J	2559	60	.32	RA	10001	110	.45	J	1002
2	.22	J	2569	60	.18	RA	10002	110	.55	J	1003
2	.28	J	2639	60	.18	RA	10003	112	.66	RA	755
2	.28	J	2649	60	.32	RA	10004	112	.16	RA	757
3	.22	J	2539	62	.32	RA	10001	112	.18	RA	759
3	.22	J	2549	62	.18	RA	10002	115	1.00	J	1001
3	.28	J	2619	62	.18	RA	10003	117	.35	J	1002
3	.28	J	2629	62	.18	RA	10004	117	.65	J	1003
4	.22	J	2519	64	.18	RA	10005	118	.10	J	1002
4	.22	J	2529	64	.18	RA	10006	118	.90	J	1003
4	.28	J	2599	64	.18	RA	10007	119	1.00	RA	759
4	.28	J	2609	64	.09	RA	10008	121	.35	J	1002
5	.22	J	579	64	.09	RA	10009	121	.65	J	1003
5	.22	J	589	64	.10	RA	10010	106	1.00	RA	961
5	.28	J	659	64	.09	RA	10011	107	.15	RA	963
5	.09	J	669	66	.43	RA	10018	107	.47	RA	965
5	.19	J	809	66	.57	RA	10019	107	.15	RA	967
6	.22	J	559	67	.35	RA	10018	107	.23	RA	969
6	.22	J	569	67	.65	RA	10019	122	.10	J	1002
6	.28	J	639	68	.75	RA	10018	122	.90	J	1003
6	.28	J	649	68	.25	RA	10019	130	1.00	J	3001
7	.22	J	539	70	.34	RA	10017	132	1.00	J	3001
7	.22	J	549	70	.33	RA	10019	134	.66	RA	752
7	.28	J	619	70	.32	RA	10018	134	.34	RA	754
7	.28	J	629	72	.45	RA	10017	140	.45	J	3002
8	.22	J	519	72	.55	RA	10019	140	.55	J	3003
8	.22	J	529	74	1.00	RA	10019	142	.66	RA	756
8	.28	J	599	76	.67	RA	10017	142	.16	RA	758
8	.28	J	609	76	.33	RA	10019	142	.18	RA	760
11	.25	J	919	77	.22	RA	10017	145	1.00	J	3001
11	.25	J	929	77	.78	RA	10019	147	.35	J	3002
11	.25	J	2919	80	.32	RA	6001	147	.65	J	3003
11	.25	J	2929	80	.18	RA	6002	148	.10	J	3002
13	.14	J	439	80	.18	RA	6003	148	.90	J	3003
13	.17	J	449	80	.32	RA	6004	149	1.00	RA	760
13	.05	J	459	82	.32	RA	6001	151	.35	J	3002
13	.14	J	469	82	.18	RA	6002	151	.65	J	3003
13	.14	J	479	82	.18	RA	6003	137	.15	RA	964
13	.17	J	489	82	.32	RA	6004	137	.47	RA	966
13	.14	J	499	84	.18	RA	6005	137	.15	RA	968
13	.05	J	509	84	.18	RA	6006	137	.23	RA	970
20	1.00	J	317	84	.18	RA	6007	152	.10	J	3002
22	1.00	J	357	84	.18	RA	6008	152	.90	J	3003
24	1.00	J	327	84	.09	RA	6009	450	1.00	RA	771
26	1.00	J	367	84	.10	RA	6010	451	1.00	RA	771
30	1.00	J	2357	84	.09	RA	6011	452	1.00	RA	771
32	1.00	J	2317	86	.43	RA	6018	453	1.00	RA	771
34	1.00	J	2327	86	.57	RA	6019	454	1.00	RA	771
36	1.00	J	2367	87	.35	RA	6018	455	1.00	RA	773
40	.50	J	337	87	.65	RA	6019	456	1.00	RA	773
40	.50	J	347	88	.75	RA	6018	457	1.00	RA	773
42	.50	J	317	88	.25	RA	6019	458	1.00	RA	773
42	.50	J	367	90	.34	RA	6017	459	1.00	RA	773
44	.50	J	377	90	.33	RA	6019	460	1.00	RA	772
44	.50	J	387	90	.32	RA	6018	461	1.00	RA	772
46	.50	J	357	92	.45	RA	6017	462	1.00	RA	772
46	.50	J	367	92	.55	RA	6019	463	1.00	RA	772
50	.50	J	2337	94	1.00	RA	6019	464	1.00	RA	772
				96	.67	RA	6017	465	1.00	RA	774

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467	1.00	RA	774	383	.50	RA	790	172	.50	RF	24
468	1.00	RA	774	383	.15	RA	780	174	.08	RF	31
469	1.00	PA	774	383	.25	RA	792	174	.20	RF	32
301	.67	J	131	383	.10	RA	786	174	.13	RF	33
301	.33	J	141	384	.45	RA	783	174	.13	RF	34
305	.12	J	141	384	.20	RA	793	174	.13	RF	38
305	.22	J	151	384	.12	RA	787	174	.13	RF	39
305	.21	J	161	384	.13	RA	785	174	.20	RF	40
305	.21	J	171	384	.10	RA	781	175	.31	RF	35
305	.24	J	181	385	.45	RA	782	175	.08	RF	36
306	.10	J	141	385	.20	RA	792	175	.15	RF	20
306	.22	J	151	385	.12	RA	780	175	.15	RF	21
306	.23	J	161	385	.13	RA	784	175	.16	RF	22
306	.23	J	171	385	.10	RA	780	175	.15	RF	23
306	.24	J	181	386	.33	RA	781	177	.31	RF	37
307	.10	RA	701	386	.67	RA	783	177	.23	RF	26
307	.08	RA	702	387	.33	RA	780	177	.15	RF	25
307	.13	RA	703	387	.67	RA	782	177	.16	RF	24
307	.12	RA	704	388	.60	RA	787	177	.15	RF	23
307	.17	RA	705	388	.40	RA	785	180	1.00	RF	28
307	.11	RA	706	389	.60	RA	786	181	1.00	RF	28
307	.07	RA	707	389	.40	RA	784	182	1.00	RF	29
307	.06	RA	708	390	.60	RA	785	183	1.00	RF	17
307	.16	RA	709	390	.40	RA	787	184	1.00	RF	18
311	.67	J	2131	391	.60	RA	784	185	1.00	RF	18
311	.33	J	2141	391	.40	RA	786	190	.50	RF	16
315	.12	J	2141	392	.60	RA	788	190	.50	RF	30
315	.22	J	2151	392	.30	RA	786	230	.20	RA	7003
315	.21	J	2161	392	.10	RA	784	230	.18	RA	7004
315	.21	J	2171	393	.60	RA	789	230	.15	RA	7006
315	.24	J	2181	393	.30	RA	787	230	.16	RA	7007
316	.10	J	2141	393	.10	RA	785	230	.15	RA	7009
316	.22	J	2151	160	1.00	RF	1	230	.16	RA	7010
316	.23	J	2161	161	.26	RF	2413	240	.28	RA	7001
316	.23	J	2171	161	.37	RF	12	240	.28	RA	7002
316	.24	J	2181	161	.37	RF	19	240	.22	RA	7005
317	.10	RA	711	162	.26	RF	2438				
317	.08	RA	712	162	.37	RF	15				
317	.13	RA	713	162	.37	RF	27				
317	.12	RA	714	163	.60	RF	2410				
317	.17	RA	715	163	.25	RF	13				
317	.11	RA	716	163	.15	RF	19				
317	.07	RA	717	164	.60	RF	2435				
317	.06	RA	718	164	.25	RF	14				
317	.16	RA	719	164	.15	RF	27				
420	1.00	RA	703	165	.60	RF	2411				
425	1.00	RA	713	165	.25	RF	13				
250	.06	RA	7052	165	.15	RF	20				
250	.12	RA	7055	166	.60	RF	2436				
250	.06	RA	7057	166	.25	RF	14				
250	.76	RA	7059	166	.15	RF	26				
260	.06	RA	7051	167	.25	RF	2412				
260	.06	RA	7053	167	.20	RF	13				
260	.06	RA	7054	167	.55	RF	20				
260	.06	RA	7056	168	.25	RF	2437				
260	.76	RA	7058	168	.20	RF	14				
202	1.00	RA	793	168	.55	RF	26				
203	1.00	RA	799	169	.25	RF	2419				
380	.40	RA	789	169	.50	RF	21				
380	.60	RA	791	169	.25	RF	22				
381	.40	RA	788	170	.25	RF	2444				
381	.60	RA	790	170	.25	RF	24				
382	.50	RA	791	170	.50	RF	25				
382	.15	RA	781	171	.50	RF	2406				
382	.25	RA	793	171	.50	RF	22				

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*FOR,IS TEMP

C
C

C TAPE10 = NEW OUTPUT NODE/TEMP (INPUT TO SPACE)
C TAPE11 = FORE ROCKWELL SINDA TAPE
C TAPE12 = MID(390) JSC SINDA TAPE
C TAPE13 = AFT ROCKWELL SINDA TAPE
C TAPE14 = MMA/OTHER NODE MAP

C

C THIS MODEL USES @FORE@ROCKWELL (UNIT 11) THERMAL MODEL,
C JSC 390 MID-SECTION (UNIT 12) THERMAL MODEL,
C AND THE @AFT@ROCKWELL (UNIT 13) THERMAL MODEL
C TO GENERATE A @TAPE10@FOR INPUT TO THE MMA
C SPACE PROGRAM. TAPE 10 IS THE NODE/TEMP
C FILE USED FOR CONTAMINATION INPUT

C

DIMENSION MMAI(400),PERC(400),IKEY(400),NEWN(400)
DIMENSION JSC(66),JSCC(66),TJSC(66)
DIMENSION IRF(35),IRFC(35),TIRF(35)
DIMENSION IRA(105),IRAC(105),TIRA(105)
DIMENSION HEAD1(12),HEAD2(12),HEAD3(12),ISUB3(3),TIME(3)
DIMENSION MMAO(300),TEMPC(7,300)
LOGICAL FORE,AFT,MID,DEBUG
NAMELIST/TIN/ FORE,MID,AFT,DEBUG,NUMBER

C

REWIND 10
REWIND 11
REWIND 12
REWIND 13
REWIND 14

C

READ(5,TIN)

C

C READ IN MMA=JSC/ROCK NODE MAPPER

C

DO 1 I=1,400
READ(14,100,END=2)MMAI(I),PERC(I),IKEY(I),NEWN(I)
IF(MMAI(I).EQ.0) GO TO 2
ISORT=I

1

CONTINUE

2

CONTINUE

100

FORMAT(I5,F10.2,A2,3X,I5)

CALL BLCKT(JSC,IRF,IRA,ISUB3)

LOOP OVER NUMBER OF TEMPERATURE SLOTS

C

C

DO 1000 NUM=1,NUMBER

C

C

CAREFULLY ZERO OUT ARRAYS TIRF TJSC TIRA TIME

C

DO 300 NP=1,35
TIRF(NP)=0.0

300

CONTINUE

DO 301 NP=1,66
TJSC(NP)=0.0

301

CONTINUE

DO 302 NP=1,105
TIRA(NP)=0.0

302

CONTINUE

C

C

CHEQUE WHICH OR ANY MODELS ARE BEING USED AND BUILD THEIR SHORT AR

C

IF(,NOT,FORE)GO TO 3
IUNIT=11

```

CALL SORT (IRA,IRAC,TIRA,NUM,ISUB3,K,IUNIT,HEAD2,TIME(2))
WRITE(6,102) (HEAD1(I),I=1,12),TIME(1)
3  CONTINUE
  IF(,NOT,MID) GO TO 4
  IUNIT=12
  K=2
  CALL SORT(JSC,JSCC,TJSC,NUM,ISUB3,K,IUNIT,HEAD2,TIME(2))
  WRITE(6,102) (HEAD2(I),I=1,12),TIME(2)
4  CONTINUE
  IF(,NOT,AFT) GO TO 5
  IUNIT=13
  K=3
  CALL SORT (IRA,IRAC,TIRA,NUM,ISUB3,K,IUNIT,HEAD3,TIME(3))
  WRITE(6,102) (HEAD3(I),I=1,12),TIME(3)
5  CONTINUE
102 FORMAT(1H1,10X,12A6,5X,5HTIME,F10.2)

```

```

C      START CALCULATING TEMPERATURES FOR MMA NODES

```

```

C      IF((DEBUG).AND.(NUM.LE.2)) WRITE(6,103)
103  FORMAT(1H1,/,10X,13HDEBUG OUTPUT,/,
  *10X,3HMMA,3X,4HPERC,2X,5HOTHER,2X,5HMODEL,3X,5HOTHER,5X,
  *5HACCUM,3X,5HACCUM,2X,3HMMA,
  *10X,4HNODE,8X,4HNODE,4X,3HKEY,4X,7HTEMP(F),3X,7HTEMP(F),
  *1X,4HPERC,3X,3HSUB)

```

```

C      LOOP TO ACTUALLY COMPUTE NEW TEMPERATURES
C      ICT IS MMA SUBSCRIPT
C      ICT=0

```

```

C      DO 6 I=1,ISORT
C      ICT=ICT + 1
C      IF(I.EQ.1) GO TO 14
C      IF(MMAI(I).EQ.MMAI(I-1)) GO TO 8
7    MMAO(ICT)=MMAI(I)
C      TPERC=PERC(I)
C      IFLAG=0
C      GO TO 9
8    CONTINUE
C      TPERC=TPERC + PERC(I)
C      IF(TPERC.GT.1.0) GO TO 7
C      ICT=ICT-1
C      IFLAG=1
9    CONTINUE

```

```

C      IMODEL=IKEY(I)
C      INEED =NEWN(I)

```

```

C      SEARCH SHORT OTHER ARRAYS FOR TEMPERATURES

```

```

C      IF((IMODEL.EQ.2HRF).AND.(FORE))
C      * CALL SHORT(INEED,IRF,TIRF,ISUB3(1),TF0,IMODEL)
C      IF((IMODEL.EQ.2HJ).AND.(MID))
C      * CALL SHORT(INEED,JSC,TJSC,ISUB3(2),TF0,IMODEL)
C      IF((IMODEL.EQ.2HRA).AND.(AFT))
C      * CALL SHORT(INEED,IRA,TIRA,ISUB3(3),TF0,IMODEL)

```

```

C      NOW YOU HAVE FOUND A TEMPERATURE FOR THE NODE
C      PROCEED.

```

```

C      IF(IFLAG.EQ.1) GO TO 10
C      WHOLE TEMPERATURE
C      TEMRF=TF0 * PERC(I)
C      TEMPC(NUM,ICT)=CENTI(TEMPF)
C      GO TO 11

```

```

C      PARTIAL TEMPERATURE
      TEMPF = TEMPF + (TFO * PERC(I))
      TEMPC(NUM,ICT) = CENTI(TEMPF)
11     CONTINUE

```

```

C      WRITE( DEBUG) RESULTS

```

```

C      IF(DEBUG) WRITE(6,104)
      *MMAO(ICT),PERC(I),NEWN(I),IKEY(I),TFO,TEMPF,TPERC,ICT
104    FORMAT(9X,I5,1X,F5.1,1X,I5,4X,A2,4X,F6.2,2X,F8.2,1X,F4.1,3X,I3)
14     IF(TPERC.GT.1) GO TO 12
      GO TO 13
12     WRITE(6,202)MMAI(I),PERC(I),JSCN(II)
202    FORMAT(1X,20H+++ CAUTION MMA NODE ,I5,
      * 1X,17H HAS A PERCENT OF,F6.2,
      * 1X,16H FOR OTHER NODE ,I5,/,
      * 1X,37HTHIS PERC ADDED WITH OTHERS IS GT ONE,
      * 1X,34H IT IS BEING DISCARDED-CHECK FILES)
      TPERC=0.0
13     CONTINUE
6      CONTINUE

```

```

C      END OF ONE SET OF TEMPERATURES@

```

```

C      IF(DEBUG)WRITE(6,105)
      IF(DEBUG)WRITE(6,106) (MMAO(IK),TEMPC(NUM,IK),IK=1,ICT)
105    FORMAT(1H1,/,10X,24HDEBUG MMA NODE TEMP(C))
106    FORMAT(20X,I5,1X,F10.2)

```

```

C      END LOOP OVER TIME INCREMENTS

```

```

1000 CONTINUE

```

```

C      WRITE SPACE UNIT 10

```

```

C      WRITE(10,107) ((MMAO(IC),TEMPC(NUM,IC),NUM=1,NUMBER),IC=1,ICT)
107    FORMAT(I5,7F10.3)
      RETURN
      END

```

```

*FOR,IS BLCKT,BLCKT

```

```

      SUBROUTINE BLCKT (JSC,IRF,IRA,ISUB3)

```

```

C      MASTER ARRAYS FOR NODES USE BY MMA FROM 3 THERMAL MODELS

```

```

C      DIMENSION JSC(66),IRF(35),IRA(105),ISUB3(3)
      DATA(JSC(I),I=1,66)
1/2519,2529,2539,2549,2559,2569,2579,2589,2669,2809,
2 2919,2929,469,499,519,529,539,549,559,569,579,589,
3 669,809,919,929,439,479,449,459,489,509,317,327,
4 337,347,357,367,377,387,2317,2327,2337,2347,2357,
52367,2377,2387,1001,1002,1003,3001,3002,3003,131,
6141,151,161,171,181,2131,2141,2151,2161,2171,2181/
      DATA(IRF(I),I=1,35)
1/2413,12,19,2410,13,2411,20,2412,2419,21,22,2438,
215,27,2435,14,2436,26,2437,2444,25,24,2406,32,33,
334,35,36,2431,40,39,38,37,31,23/
      DATA(IRA(I),I=1,105)
1/6801,6002,6003,6004,6005,6006,6007,6008,6009,6010,
26011,10001,10002,10003,10004,10005,10006,10007,10008,
310009,10010,10011,6117,6118,6119,10017,10018,10019,
4751,753,755,757,759,961,963,965,967,969,771,773,752,
5754,756,758,760,962,964,966,968,970,772,774,
6701,702,703,704,705,706,707,708,709,711,712,713,
7 1,715,716,717,718,719,7051,7052,7053,7055,7058,
87059,793,799,781,783,785,786,780,782,784,787,789,
9791,793,788,790,792,7005,7006,7007,7008,7009,7010,
97001,7002,7003,7004,7056,7057,7054/

```

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END

IFOR,IS SORT,SORT

C

SUBROUTINE SORT(NODEA,SAVSUB,STEMP,NUM,ISUB3,K,IUNIT,HEAD,TIMES)

C

INSPECT EACH THERMAL MODEL AND SELECT ONLY THOSE

C

SUBSCRIPTS YOU WILL NEED IN YOUR ANALYSIS

C

SAVE THIS ARRAY AS +SAVSUB;

C

TEMPERATURE ARRAY IS +STEMP.

C

THESE ARE SHORT ARRAYS.THE ACTUAL SINDA RECORDS RANGE

C

IN LENGTH FROM 500 TO 1900 WORDS. THIS SUBROUTINE WILL

C

DUMP THESE LARGE ARRAYS INTO +MNODES+(FOR NODES) AND

C

+ TTEMP + FOR SELECTION. THIS SUBROUTINE WILL GATHER UP

C

THE SHORTENED ARRAYS, AND LEAVE TO DO THE REPETITIVE

C

IN SPECTING.A FLAG CALLED NUM IS USE HERE TO SKIP

C

THE READ OF THE NODE RECORD.NUM MAY ONLY RANGE FROM

C

1 TO 7 AS THIS IS THE MAX NO OF TEMPERATURES ALLOWABLE

C

ON THE SPACE UNIT 10.THE USERMUST DEFINE NUM,

C

NODEA=ONE OF THE 3ARRAYS DATED IN OF JSC/N NODES NEEDED

C

(ILSUB=LARGE SUBSCRIPTS SAVED, SINDA'S REC LGNTH PER MODEL)

C

DIMENSION MNODES(2000), TTEMP(2000)

DIMENSION SAVSUB(105),STEMP(105)

DIMENSION NODEA(105),ISUB(3),ILSUB(3)

DIMENSION HEAD(12)

INTEGER SAVSUB,HEAD

LOGICAL FOR,MID,AFT,DEBUG

C

ROLL IN LARGE ARRAYS

IF(NUM.GT.1) GO TO 4

READ(IUNIT,END=101) HEAD,{LL,I=1,5},NW,NPR,NVP,LL,LL,LL,NW,LL,LL,

NSL,Nw,NPR,NVP,(MNODES(I),I=1,NSL)

C

CREAT A SUBSCRIPT ARRAY FOR FUTURE USE FOR THIS MODEL

C

ILSUB(K)=NSL

M=ISUB3(K)

DO 1 I=1,M

DO 2 J=1,NSL

IF(MNODES(J).EQ.0) GO TO 4

JJ=J

IF(NODEA(I).EQ.MNODES(J))GO TO 5

2 CONTINUE

WRITE(6,100) NODEA(I)

100 FORMAT(20X,32H **CAUTION A MATCH FOR OTHERNODE,15,
+44H WAS NEVER FOUND.)

GO TO 1

5 SAVSUB(I)=JJ

1 CONTINUE

4 CONTINUE

C

NOW COLLECT TEMPERATURES ONE ON ONE FROM SAVSUB

NSL=ILSUB(K)

READ(IUNIT,END=101)TIME(K),L,L,C,L,(TTEMP(I),I=1,NSL)

DO 6 I=1,M

K=SAVSUB(I)

STEMP(I)=TTEMP(K)

6 CONTINUE

IF(DEBUG)WRITE(6,102) (NODEA(I),STEMP(I),SAVSUB(I),I=1,M)

102 FORMAT(10X,15,2X,F10.3,2X,15)

101 WRITE(6,103) IUNIT

103 FORMAT(" EOF ENCOUNTERED ON UNIT ",15)

RETURN

END

IFOR,IS SHORT,SHORT

SUBROUTINE SHORT(IINEED,ION,TMP,IS,TFO,IMODEL)

DIMENSION ION(110),TMP(110)

C

```

DO 1 I=1,IS
ISUB=I
IF (INEED.EQ.ION(I)) GO TO 2
1 CONTINUE
GO TO 3
2 TFO=TMP(ISUB)
RETURN
3 WRITE(6,100)INEED,IMODEL
100 FORMAT(10X,19H++++ CAUTION +++++,
          30H,NO TEMPERATURE FOUND FOR NODE,I5,
          2X,10H IN MODEL,A2)
RETURN
END
*FOR,I5 CENTI,CENTI
FUNCTION CENTI(T)
CENII =(5./9.)*(T-32.)
RETURN
END

```

Figure A-2 Continued

A-9

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APPENDIX B

SPACE PROGRAM CHANGES FOR FILTER INCLUSION

APPENDIX B

SPACE PROGRAM CHANGES FOR FILTER INCLUSION

1. BLCKA - The changes to BLCKA are shown by the black lines in Figure B-1. These were required for inclusion into the SPACE program.
2. BLCKC - Figure B-2 shows the changes to this subroutine as indicated by the black lines.
3. MLOSSR - Figure B-3 shows the changes to this subroutine as indicated by the black lines.

SUBROUTINE BLCKA

```

*****
*
*          BLOCK DATA A
*
*****

```

CODED BY: M. HETRICK 2/16/77
D. STRANGE 1/21/77

OBJECTIVE:

THIS ROUTINE SETS UP THE STS ORBITER CONFIGURATION BY DEFINING
GEOMETRIC SURFACES, THEIR IDENTIFICATION NUMBERS, LOCATION, MATERIAL
AND AREA.

```

IDENT = SURFACE IDENTIFICATION NUMBER
SECT  = ORBITER/SPACELAB GEOMETRIC SUBSECTION
RADOOR= RADIATOR DOOR
BAY   = PAYLOAD BAY LINER, SIDE STRIPS, BULKHEADS
TAIL  = TAILFIN
CREW  = NOSE, CREW SECTION
WING  = WINGS
FUSLAG= FUSELAGE
OMS   = OMS PODS
FILTER= OVERBOARD/INBOARD FILTERS
MATRL = SURFACE MATERIAL
LINER = PAYLOAD BAY LINER
BLKHED= FORE AND AFT BAY BULKHEADS
TEFLON= TEFLON
LRSI  = LOW TEMP RSI
HRSI  = HIGH TEMP RSI
NOMEX = PAINTED FELT
RCC   = CARBON
CRACKS= LEAKING SURFACE
WINDOW= CABIN WINDOWS
FILI  = INBOARD FILTERS
FILO  = OVERBOARD FILTERS
AREA  = SURFACE AREA IN SQUARE INCHES

```

COMMON/CNTRL/DEPSIT,DBUGA,DBUGB,DBUGC,DBUGD,ED,ENG,

```

1 EVAP, FIVP, LEAK, LMOP, MAXTMP,MCD,
2 MFPATH,NEWCON,NEWTNL,NEWMFP,NEWMFS,NEWMLC,NEWTCD,
3 MINTMP,ORBITR,OUT,REFLCT,REPORT(50),
4 RFAS, RFSS, SMTP, TITLE(12), TSTART(3),
5 TSTOP(3), GO, SUNL, SUNM, SUNH

```

COMMON/PTSRCE/CIDENT(50),CLOC(50),CTYPE(50),CXLOC(50),CYLOC(50),
CZLOC(50),PLUMEC(10,5),SPECMF(10,5)

COMMON/SEGA/JTOTAL,JKEEP,KINDS,KTOTAL

COMMON/SOURCE/SURFSC(300),PNTSC(50),ONTIME(50),SSURFS(300)

COMMON/SURF/IDENT(300),SECT(300),MATRL(300),AREA(300)

LOGICAL DBUGA,ED,ENG,EVAP,FIVP,LEAK,LMOP,ORBITR,OUT,SMTP,REFLCT

DIMENSION IORSTR(1000),IPTSC(300)

INTEGER CIDENT,CLOC,CTYPE,CXLOC,CYLOC,CZLOC,PNTSC,SECT,SSURFS,
SURFSC

CURRENTLY THERE ARE 190 SURFACES USED ON THE ORBITER SYNTHESIS
DATA NSURFO /190/

* * MASTER ARRAY FOR ORBITER * *

```

BLCKA 5
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BLCKA 60
BLCKA 61

```

Figure B-1 BLCKA Changes

B-3

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```

C
60      DATA(IORBTR(I),I=1,40)
        1 /20,6HRADOOR,6HTEFLON, 12200,
        2 22,6HRADOOR,6HTEFLON, 12200,
        3 24,6HRADOOR,6HTEFLON, 12200,
        4 26,6HRADOOR,6HTEFLON, 12200,
        5 30,6HRADOOR,6HTEFLON, 12200,
65      6 32,6HRADOOR,6HTEFLON, 12200,
        7 34,6HRADOOR,6HTEFLON, 12200,
        8 36,6HRADOOR,6HTEFLON, 12200,
        9 40,6HRADOOR,6HTEFLON, 25580,
        * 42,6HRADOOR,6HTEFLON, 25580/
70      C 10
        DATA(IORBTR(I),I=41,80)
        1 /44,6HRADOOR,6HTEFLON, 25580,
        2 46,6HRADOOR,6HTEFLON, 25580,
        3 50,6HRADOOR,6HTEFLON, 25580,
75      4 52,6HRADOOR,6HTEFLON, 25580,
        5 54,6HRADOOR,6HTEFLON, 25580,
        6 56,6HRADOOR,6HTEFLON, 24990,
        7 21,6HFUSLAG,6H LRSI, 12200,
        8 23,6HFUSLAG,6H LRSI, 12200,
80      9 25,6HFUSLAG,6H LRSI, 12200,
        * 27,6HFUSLAG,6H LRSI, 12200/
        C 20
        DATA(IORBTR(I),I=81,120)
        1 /31,6HFUSLAG,6H LRSI, 12200,
85      2 33,6HFUSLAG,6H LRSI, 12200,
        3 35,6HFUSLAG,6H LRSI, 12200,
        4 37,6HFUSLAG,6H LRSI, 12200,
        5 41,6HFUSLAG,6H LRSI, 25580,
        6 43,6HFUSLAG,6H LRSI, 25580,
90      7 45,6HFUSLAG,6H LRSI, 25580,
        8 47,6HFUSLAG,6H LRSI, 25580,
        9 51,6HFUSLAG,6H LRSI, 24990,
        * 53,6HFUSLAG,6H LRSI, 24990/
        C 30
95      DATA(IORBTR(I),I=121,160)
        1 /55,6HFUSLAG,6H LRSI, 24990,
        2 57,6HFUSLAG,6H LRSI, 24990,
        3 202,6HFUSLAG,6H LRSI, 32520,
100     4 203,6HFUSLAG,6H LRSI, 32520,
        5 230,6HFUSLAG,6H LRSI, 25730,
        6 240,6HFUSLAG,6H LRSI, 16340,
        7 241,6HFUSLAG,6H LRSI, 16340,
        8 250,6HFUSLAG,6H LRSI, 19580,
        9 260,6HFUSLAG,6H LRSI, 20240,
105     * 301,6HFUSLAG,6H LRSI, 26600/
        C 40
110     DATA(IORBTR(I),I=161,200)
        1 /305,6HFUSLAG,6H LRSI, 30930,
        2 306,6HFUSLAG,6H NOMEX, 30930,
        3 307,6HFUSLAG,6H NOMEX, 24770,
        4 311,6HFUSLAG,6H LRSI, 26600,
        5 315,6HFUSLAG,6H LRSI, 30930,
        6 316,6HFUSLAG,6H NOMEX, 30930,
        7 317,6HFUSLAG,6H NOMEX, 24770,

```

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BLCKA 62
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BLCKA 118

```

115 8 420,6HFUSLAG,6H LRSI, 1312,
9 425,6HFUSLAG,6H LRSI, 1312,
* 60,6H OMS,6H LRSI, 1145/
C 50 DATA(IORBTR(I),I=201,240)
120 1 /62,6H OMS,6H LRSI, 7850,
2 64,6H OMS,6H LRSI, 37920,
3 66,6H OMS,6H LRSI, 1991,
4 67,6H OMS,6H LRSI, 2028,
5 68,6H OMS,6H LRSI, 415,
125 6 70,6H OMS,6H LRSI, 895,
7 72,6H OMS,6H LRSI, 1406,
8 74,6H OMS,6H LRSI, 1312,
9 76,6H OMS,6H LRSI, 715,
* 77,6H OMS,6H LRSI, 600/
C 60 DATA(IORBTR(I),I=241,280)
130 1 /80,6H OMS,6H LRSI, 1145,
2 82,6H OMS,6H LRSI, 7813,
3 84,6H OMS,6H LRSI, 37740,
135 4 86,6H OMS,6H LRSI, 1991,
5 87,6H OMS,6H LRSI, 2028,
6 88,6H OMS,6H LRSI, 415,
7 90,6H OMS,6H LRSI, 895,
8 92,6H OMS,6H LRSI, 1406,
140 9 94,6H OMS,6H LRSI, 1312,
* 96,6H OMS,6H LRSI, 715/
C 70 DATA(IORBTR(I),I=281,320)
145 1 /97,6H OMS,6H LRSI, 601,
2 100,6H WING,6H NOMEX, 6356,
3 102,6H WING,6H NOMEX, 29590,
4 104,6H WING,6H NOMEX, 9125,
5 110,6H WING,6H NOMEX, 23340,
6 112,6H WING,6H NOMEX, 19380,
150 7 115,6H WING,6H LRSI, 19280,
8 117,6H WING,6H HRSI, 5650,
9 118,6H WING,6H HRSI, 2508,
* 119,6H WING,6H LRSI, 3302/
C 80 DATA(IORBTR(I),I=321,360)
155 1 /121,6H WING,6H RCC, 2251,
2 122,6H WING,6H RCC, 3123,
3 130,6H WING,6H NOMEX, 6356,
4 132,6H WING,6H NOMEX, 29590,
160 5 134,6H WING,6H NOMEX, 9125,
6 140,6H WING,6H NOMEX, 23340,
7 142,6H WING,6H NOMEX, 19380,
8 145,6H WING,6H LRSI, 19280,
9 147,6H WING,6H HRSI, 5650,
165 * 148,6H WING,6H HRSI, 2508/
C 90 DATA(IORBTR(I),I=361,400)
170 1 /149,6H WING,6H LRSI, 3302,
2 151,6H WING,6H RCC, 2251,
3 152,6H WING,6H RCC, 3123,
4 106,6HELEVON,6H NOMEX, 6499,

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Figure B-1 Continued

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B-5

175 5 107,6HELEVON,6H NOMEX, 17210,
 6 136,6HELEVON,6H NOMEX, 6499,
 7 137,6HELEVON,6H NOMEX, 9125,
 8 450,6HELEVON,6H NOMEX, 138,
 9 451,6HELEVON,6H NOMEX, 415,
 * 452,6HELEVON,6H NOMEX, 692/

C 100

180 DATA(IORBTR(I),I=401,440)
 1 /453,6HELEVON,6H NOMEX, 960,
 2 454,6HELEVON,6H NOMEX, 1246,
 3 455,6HELEVON,6H NOMEX, 1523,
 4 456,6HELEVON,6H NOMEX, 1800,
 5 457,6HELEVON,6H NOMEX, 2076,
 185 6 458,6HELEVON,6H NOMEX, 2353,
 7 459,6HELEVON,6H NOMEX, 2630,
 8 460,6HELEVON,6H NOMEX, 138,
 9 461,6HELEVON,6H NOMEX, 415,
 * 462,6HELEVON,6H NOMEX, 692/

C 110

190 DATA(IORBTR(I),I=441,480)
 1 /463,6HELEVON,6H NOMEX, 969,
 2 464,6HELEVON,6H NOMEX, 1246,
 195 3 465,6HELEVON,6H NOMEX, 1523,
 4 466,6HELEVON,6H NOMEX, 1800,
 5 467,6HELEVON,6H NOMEX, 2076,
 6 468,6HELEVON,6H NOMEX, 2353,
 7 469,6HELEVON,6H NOMEX, 2630,
 200 8 160,6H CREW,6H RCC, 7191,
 9 161,6H CREW,6H LRSI, 9348,
 * 162,6H CREW,6H LRSI, 9348/

C 120

205 DATA(IORBTR(I),I=481,520)
 1 /163,6H CREW,6H LRSI, 3380,
 2 164,6H CREW,6H LRSI, 3380,
 3 165,6H CREW,6H LRSI, 4253,
 4 166,6H CREW,6H LRSI, 4253,
 5 167,6H CREW,6H HRSI, 12590,
 210 6 168,6H CREW,6H HRSI, 12590,
 7 169,6H CREW,6H HRSI, 9600,
 8 170,6H CREW,6H HRSI, 9600,
 9 171,6H CREW,6H HRSI, 3705,
 * 172,6H CREW,6H HRSI, 3705/

C 130

215 DATA(IORBTR(I),I=521,560)
 1 /174,6H CREW,6H LRSI, 20720,
 2 175,6H CREW,6H LRSI, 10150,
 3 177,6H CREW,6H LRSI, 10150,
 220 4 180,6H CREW,6H WINDOW, 1424,
 5 181,6H CREW,6H WINDOW, 1424,
 6 182,6H CREW,6H WINDOW, 1424,
 7 183,6H CREW,6H WINDOW, 1424,
 8 184,6H CREW,6H WINDOW, 1424,
 9 185,6H CREW,6H WINDOW, 1424,
 225 * 190,6H CREW,6H LRSI, 10250/

C 140

DATA(IORBTR(I),I=561,600)
 1 /380,6H TAIL,6H LRSI, 16920,

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 BLCKA 232

Figure B-1 Continued

B-6

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230      2 381,6H TAIL,6H LRSI, 16920,
        3 382,6H TAIL,6H LRSI, 8833,
        4 383,6H TAIL,6H LRSI, 8833,
        5 384,6H TAIL,6H LRSI, 13940,
        6 385,6H TAIL,6H LRSI, 13940,
        7 386,6H TAIL,6H LRSI, 6116,
235      8 387,6H TAIL,6H LRSI, 6116,
        9 388,6H TAIL,6H LRSI, 2744,
        * 389,6H TAIL,6H LRSI, 2744/
C 150
      DATA(IORBTR(I),I=601,640)
240      1 /390,6H TAIL,6H LRSI, 1160,
        2 391,6H TAIL,6H LRSI, 1160,
        3 392,6H TAIL,6H LRSI, 3081,
        4 393,6H TAIL,6H LRSI, 3081,
        5 399,6H TAIL,6H LRSI, 3823,
245      6 1,6H BAY,6H LINER, 26620,
        7 2,6H BAY,6H LINER, 26620,
        8 3,6H BAY,6H LINER, 26620,
        9 4,6H BAY,6H LINER, 26620,
        * 5,6H BAY,6H LINER, 26620/
250      C 160
      DATA(IORBTR(I),I=641,680)
        1 /6,6H BAY,6H LINER, 26620,
        2 7,6H BAY,6H LINER, 26620,
        3 8,6H BAY,6H LINER, 26620,
255      4 11,6H BAY,6HBLKHED, 32690,
        5 13,6H BAY,6HBLKHED, 32690,
        6 440,6H BAY,6H LINER, 3444,
        7 441,6H BAY,6H LINER, 3444,
        8 442,6H BAY,6H LINER, 3444,
260      9 443,6H BAY,6H LINER, 3444,
        * 445,6H BAY,6H LINER, 3444/
C 170
      DATA(IORBTR(I),I=681,720)
265      1 /446,6H BAY,6H LINER, 3444,
        2 447,6H BAY,6H LINER, 3444,
        3 448,6H BAY,6H LINER, 3444,
        4 570,6HFILTER,6H FILI, 207,
        5 571,6HFILTER,6H FILI, 207,
        6 572,6HFILTER,6H FILI, 207,
270      7 573,6HFILTER,6H FILI, 207,
        8 580,6HFILTER,6H FILI, 207,
        9 581,6HFILTER,6H FILI, 207,
        * 582,6HFILTER,6H FILI, 207/
C 180
275      DATA(IORBTR(I),I=721,760)
        1 /583,6HFILTER,6H FILI, 207,
        2 575,6HFILTER,6H FILO, 144,
        3 576,6HFILTER,6H FILO, 144,
        4 577,6HFILTER,6H FILO, 144,
280      5 578,6HFILTER,6H FILO, 144,
        6 585,6HFILTER,6H FILO, 144,
        7 586,6HFILTER,6H FILO, 144,
        8 587,6HFILTER,6H FILO, 144,
        9 588,6HFILTER,6H FILO, 144,
285      * 13,6H BAYL,6HCRACKS, 32690/

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C
C *****
C * * MASTER ARRAY FOR ENGINES * *
C
290 C FORWARD RCS ENGINES
C DATA(IPTS(I),I=1,84)
C   1 /7112,6HFLF -X,6H RCS, 332, -14, 389,
C   2 7122,6HFCF -X,6H RCS, 332, 0, 391,
295 C   3 7132,6HFRF -X,6H RCS, 332, 14, 389,
C   4 7123,6HFLS +Y,6H RCS, 360, -47, 368,
C   5 7113,6HFLS +Y,6H RCS, 360, -47, 354,
C   6 7115,6HFLU +Z,6H RCS, 350, -13, 395,
C   7 7125,6HFCU +Z,6H RCS, 350, 0, 395,
300 C   8 7135,6HFRU +Z,6H RCS, 350, 13, 395,
C   9 7116,6HFLD -Z,6H RCS, 333, -41, 381,
C   * 7126,6HFLD -Z,6H RCS, 347, -45, 386,
C   1 7144,6HFRS -Y,6H RCS, 362, 47, 368,
C   2 7134,6HFRS -Y,6H RCS, 362, 47, 354,
305 C   3 7136,6HFRD -Z,6H RCS, 333, 41, 381,
C   4 7146,6HFRD -Z,6H RCS, 347, 45, 386/
C AFT RCS ENGINES LEFT SIDE OF ORBITER
C DATA(IPTS(I),I=85,156)
C   5 /7211,6HALA +X,6H RCS, 1557, -119, 473,
310 C   6 7231,6HALA +X,6H RCS, 1557, -132, 473,
C   7 7243,6HALS +Y,6H RCS, 1516, -123, 459,
C   8 7223,6HALS +Y,6H RCS, 1529, -123, 459,
C   9 7233,6HALS +Y,6H RCS, 1542, -122, 459,
C   * 7213,6HALS +Y,6H RCS, 1555, -122, 459,
315 C   1 7245,6HALU +Z,6H RCS, 1516, -132, 481,
C   2 7225,6HALU +Z,6H RCS, 1529, -132, 481,
C   3 7215,6HALU +Z,6H RCS, 1542, -132, 481,
C   4 7246,6HALD -Z,6H RCS, 1516, -112, 437,
C   5 7226,6HALD -Z,6H RCS, 1529, -111, 440,
320 C   6 7236,6HALD -Z,6H RCS, 1542, -110, 443/
C AFT RCS ENGINES RIGHT SIDE OF ORBITER
C DATA(IPTS(I),I=157,228)
C   7 /7311,6HARA +X,6H RCS, 1557, 119, 473,
325 C   8 7331,6HARA +X,6H RCS, 1557, 132, 473,
C   9 7344,6HARS -Y,6H RCS, 1516, 123, 459,
C   * 7324,6HARS -Y,6H RCS, 1529, 123, 459,
C   1 7334,6HARS -Y,6H RCS, 1542, 123, 459,
C   2 7314,6HARS -Y,6H RCS, 1555, 123, 459,
C   3 7345,6HARU +Z,6H RCS, 1516, 132, 481,
330 C   4 7325,6HARU +Z,6H RCS, 1529, 132, 481,
C   5 7315,6HARU +Z,6H RCS, 1542, 132, 481,
C   6 7346,6HARD -Z,6H RCS, 1516, 112, 437,
C   7 7326,6HARD -Z,6H RCS, 1529, 111, 440,
C   8 7336,6HARD -Z,6H RCS, 1542, 110, 443/
335 C RCS VERNIER ENGINES
C DATA(IPTS(I),I=229,264)
C   9 /8116,6HFLD -Z,6H VCS, 324, -46, 374,
C   * 8136,6HFRD -Z,6H VCS, 324, 46, 374,
340 C   1 8257,6HALD -Z,6H VCS, 1565, -144, 459,
C   2 8258,6HALS +Y,6H VCS, 1565, -118, 457,
C   3 8357,6HARD -Z,6H VCS, 1555, 144, 459,
C   4 8358,6HARS +Y,6H VCS, 1565, -118, 457/
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Figure B-1 Continued

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C FLASH EVAPORATER

345 DATA(IPTS(I),I=265,276)
 5 /6877,6HARS +Y,6H EVAP1, 1506, 127, 305,
 6 6879,6HALS -Y,6H EVAP1, 1506, -127, 305/

C OMS ENGINES

350 DATA(IPTS(I),I=277,288)
 7 /9000,6HARA +X,6H OMS, 1557, 127, 473,
 8 9002,6HALA +X,6H OMS, 1557, -127, 347/

C

C+++++

355 IF(.NOT.(ENG .OR.EVAP)) GO TO 21

KK=0

355 DO 20 K=1,300,6

KK=KK+1

CIDENT(KK)= IPTS(K)

CLOC(KK) = IPTS(K+1)

CTYPE(KK) = IPTS(K+2)

360 CXLOC(KK) = IPTS(K+3)

CYLOC(KK) = IPTS(K+4)

CZLOC(KK) = IPTS(K+5)

PNTSC(KK) = IPTS(K)

20 CONTINUE

365 KTOTAL = 48

21 CONTINUE

C

NDATA0=4*NSURFO

II=0

370 DO 40 I=1,NDATA0,4

II=II+1

IDENT(II)=IORBTR(I)

SECT(II) =IORBTR(I+1)

MATRL(II)=IORBTR(I+2)

375 AREA(II) =IORBTR(I+3)

IF(MATRL(II).NE.6HCRACKS) GO TO 29

IF(LEAK) GO TO 29

II=II-1

GO TO 35

380 29 IF(SECT(II).NE.6H BAY .AND.SECT(II).NE.6H BAYL) GO TO 30

IF(LMOP.OR.SMTP.OR.FIVP) II=II-1

GO TO 35

30 IF(.NOT.(ED.OR.OUT.OR.REFLCT)) II=II-1

35 CONTINUE

385 40 CONTINUE

C

IF(II.GT.300) CALL ERRORA(15,0)

JTOTAL = II

390 IF (DBUGA) WRITE(8,6000) JTOTAL

6000 FORMAT(" WRITE(8,6000) JTOTAL ",I10)

C

C JTOTAL IS USED TO INDICATE THE MAXIMUM NUMBER OF PRESET SURFACES THAT

C WILL BE EXAMINED DURING THE ANALYSIS. THE USER CAN TURN OFF ANY

C NUMBER THRU NAMLIST MPDB.

395

C

C INSERT IDENT INTO SURFSC AND SSURF AS PART OF THE INITIALIZATION

C

IF(.NOT.(ED.OR.OUT.OR.LEAK.OR.REFLCT)) RETURN

DO 110 I=1,JTOTAL

BLCKA 347

BLCKA 348

BLCKA 349

BLCKA 350

BLCKA 351

BLCKA 352

BLCKA 353

BLCKA 354

BLCKA 355

BLCKA 356

BLCKA 357

BLCKA 358

BLCKA 359

BLCKA 360

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BLCKA 392

BLCKA 393

BLCKA 394

BLCKA 395

BLCKA 396

BLCKA 397

BLCKA 398

BLCKA 399

BLCKA 400

BLCKA 401

BLCKA 402

BLCKA 403

Figure B-1 Continued

B-9

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400

```
SSURFS(I) = IDENT(I)
SURFSC(I)=IDENT(I)
CONTINUE
RETURN
END
```

110

BLCKA	404
BLCKA	405
BLCKA	406
BLCKA	407
BLCKA	408

SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS	DEF LINE	REFERENCES
1 BLCKA	1	398 403

VARIABLES	SN	TYPE	RELOCATION
-----------	----	------	------------

1604	AREA	REAL	ARRAY	SURF	REFS	48	DEFINED	375						
0	CIDENT	INTEGER	ARRAY	PTSRCE	REFS	44	51	DEFINED	357					
62	CLOC	INTEGER	ARRAY	PTSRCE	REFS	44	51	DEFINED	358					
144	CTYPE	INTEGER	ARRAY	PTSRCE	REFS	44	51	DEFINED	359					
226	CXLOC	INTEGER	ARRAY	PTSRCE	REFS	44	51	DEFINED	360					
310	CYLOC	INTEGER	ARRAY	PTSRCE	REFS	44	51	DEFINED	361					
372	CZLOC	INTEGER	ARRAY	PTSRCE	REFS	44	51	DEFINED	362					
1	DBUGA	LOGICAL		CNTRL	REFS	38	49	389						
2	DBUGB	REAL		CNTRL	REFS	38								
3	DBUGC	REAL		CNTRL	REFS	38								
4	DBUGD	REAL		CNTRL	REFS	38								
0	DEPSIT	REAL		CNTRL	REFS	38								
5	ED	LOGICAL		CNTRL	REFS	38	49	383	398					
6	ENG	LOGICAL		CNTRL	REFS	38	49	353						
7	EVAP	LOGICAL		CNTRL	REFS	38	49	353						
10	FIVP	LOGICAL		CNTRL	REFS	38	49	381						
137	GO	REAL		CNTRL	REFS	38								
117	I	INTEGER			REFS	372	373	374	375	2*400	2*401			
					DEFINED	370	399							
0	IDENT	INTEGER	ARRAY	SURF	REFS	48	400	401	DEFINED	372				
116	II	INTEGER			REFS	371	372	373	374	375	376	378		
					2*380	381	383	387	388	DEFINED	369	371		
					378	381	383							
120	IORBTR	INTEGER	ARRAY		REFS	50	372	373	374	375				
					DEFINED	59	71	83	95	107	119	131		
					143	155	167	179	191	203	215	227		
					239	251	263	275						
2070	IPTS	INTEGER	ARRAY		REFS	50	357	358	359	360	361	362		
					363	DEFINED	292	308	322	336	344	348		
1	JKEEP	INTEGER		SEGA	REFS	46								
0	JTOTAL	INTEGER		SEGA	REFS	46	389	399	DEFINED	388				
114	K	INTEGER			REFS	357	358	359	360	361	362	363		
					DEFINED	355								
2	KINDS	INTEGER		SEGA	REFS	46								
113	KK	INTEGER			REFS	356	357	358	359	360	361	362		
					363	DEFINED	354	356						
3	KTOTAL	INTEGER		SEGA	REFS	46	DEFINED	365						
11	LEAK	LOGICAL		CNTRL	REFS	38	49	377	398					
12	LMOP	LOGICAL		CNTRL	REFS	38	49	381						
1130	MATRL	INTEGER	ARRAY	SURF	REFS	48	376	DEFINED	374					
13	MAXTMP	INTEGER		CNTRL	REFS	38								

Figure B-1 Concluded

B-10

	7	4*0.0/	BLCKC	62
		DATA(TAW(1,M),M=1,10)/2*4100.,8*18./	BLCKC	63
60	C		BLCKC	64
	C	*** TEFLON ***	BLCKC	65
		DATA(RTE(2,M),M=1,10)	BLCKC	66
	1	/5.00E-10,	BLCKC	67
	2	0.0,	BLCKC	68
65	3	2.10E-09,	BLCKC	69
	4	1.31E-09,	BLCKC	70
	5	1.06E-09,	BLCKC	71
	6	5.00E-10,	BLCKC	72
	7	4*0.0/	BLCKC	73
70		DATA(TAW(2,M),M=1,10)/2*4100.,8*18./	BLCKC	74
	C		BLCKC	75
	C	*** NOMEX ***	BLCKC	76
		DATA(RTE(3,M),M=1,10)	BLCKC	77
	1	/1.24E-09,	BLCKC	78
75	2	0.0,	BLCKC	79
	3	5.21E-09,	BLCKC	80
	4	3.25E-09,	BLCKC	81
	5	2.62E-09,	BLCKC	82
	6	1.24E-09,	BLCKC	83
80	7	4*0.0/	BLCKC	84
		DATA(TAW(3,M),M=1,10)/2*4100.,8*18./	BLCKC	85
	C		BLCKC	86
	C	*** LRSI ***	BLCKC	87
		DATA(RTE(4,M),M=1,10)	BLCKC	88
85	1	/5.10E-10,	BLCKC	89
	2	0.0,	BLCKC	90
	3	2.14E-09,	BLCKC	91
	4	1.34E-09,	BLCKC	92
	5	1.08E-09,	BLCKC	93
90	6	5.10E-10,	BLCKC	94
	7	4*0.0/	BLCKC	95
		DATA(TAW(4,M),M=1,10)/2*4100.,8*18./	BLCKC	96
	C		BLCKC	97
	C	*** HRSI ***	BLCKC	98
95		DATA(RTE(5,M),M=1,10)	BLCKC	99
	1	/5.20E-10,	BLCKC	100
	2	0.0,	BLCKC	101
	3	2.18E-09,	BLCKC	102
	4	1.36E-09,	BLCKC	103
100	5	1.10E-09,	BLCKC	104
	6	5.20E-10,	BLCKC	105
	7	4*0.0/	BLCKC	106
		DATA(TAW(5,M),M=1,10)/2*4100.,8*18./	BLCKC	107
	C		BLCKC	108
105	C	*** RCC ***	BLCKC	109
		DATA(RTE(6,M),M=1,10)	BLCKC	110
	1	/1.00E-12,	BLCKC	111
	2	0.0,	BLCKC	112
	3	4.20E-12,	BLCKC	113
110	4	2.62E-12,	BLCKC	114
	5	2.12E-12,	BLCKC	115
	6	1.00E-12,	BLCKC	116
	7	4*0.0/	BLCKC	117
		DATA(TAW(6,M),M=1,10)/2*4100.,8*18./	BLCKC	118

Figure B-2 continued
B-12

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115	C		BLCKC	119
	C	*** BULKHEAD ***	BLCKC	120
		DATA(RTE(7,M),M=1,10)	BLCKC	121
	1	/1.00E-09,	BLCKC	122
	2	0.0,	BLCKC	123
120	3	4.20E-09,	BLCKC	124
	4	2.62E-09,	BLCKC	125
	5	2.12E-09,	BLCKC	126
	6	1.00E-09,	BLCKC	127
	7	4*0.0/	BLCKC	128
125		DATA(TAW(7,M),M=1,10)/2*4100.,8*18./	BLCKC	129
	C		BLCKC	130
	C	*** WINDOW ***	BLCKC	131
		DATA(RTE(8,M),M=1,10)	BLCKC	132
	1	/0.0,	BLCKC	133
130	2	0.0,	BLCKC	134
	3	0.0,	BLCKC	135
	4	0.0,	BLCKC	136
	5	0.0,	BLCKC	137
	6	0.0,	BLCKC	138
135	7	4*0.0/	BLCKC	139
		DATA(TAW(8,M),M=1,10)/10*4100./	BLCKC	140
	C		BLCKC	141
	C	*** MTCS - MULTI-LAYER INSULATION ***	BLCKC	142
		DATA(RTE(9,M),M=1,10)	BLCKC	143
140	1	/0.0,	BLCKC	144
	2	1.29E-09,	BLCKC	145
	3	1.89E-06,	BLCKC	146
	4	1.20E-06,	BLCKC	147
	5	9.77E-07,	BLCKC	148
145	6	4.60E-07,	BLCKC	149
	7	4*0.0/	BLCKC	150
		DATA(TAW(9,M),M=1,10)/2*4100.,8*3./	BLCKC	151
	C		BLCKC	152
	C	*** PTCS - CHEMGLAZE ***	BLCKC	153
150		DATA(RTE(10,M),M=1,10)	BLCKC	154
	1	/3.99E-11,	BLCKC	155
	2	0.0,	BLCKC	156
	3	4.41E-09,	BLCKC	157
	4	2.75E-09,	BLCKC	158
155	5	2.23E-09,	BLCKC	159
	6	1.05E-09,	BLCKC	160
	7	4*0.0/	BLCKC	161
		DATA(TAW(10,M),M=1,10)/2*4100.,8*10./	BLCKC	162
160	C		BLCKC	163
	C		BLCKC	164
	C	*** CABIN ATMOSPHERE LEAKS (CRACKS) ***	BLCKC	165
		AREA = 3.27E4 SQ INCHES	BLCKC	166
		DATA(RTE(11,M),M=1,10)	BLCKC	167
165	1	/0.0,	BLCKC	168
	2	0.0,	BLCKC	169
	3	8.725E-10,	BLCKC	170
	4	6.540E-08,	BLCKC	171
	5	8.725E-10,	BLCKC	172
	6	2.007E-08,	BLCKC	173
170	7	4*0.0/	BLCKC	174
		DATA(TAW(11,M),M=1,10)/10*0.0/	BLCKC	175

B-13
Figure B-2 continued

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C
C *** LMOP LEAKAGE (LEAKL) ***
C AREA = 1.937E5 SQ INCHES
175 DATA(RTE(12,M),M=1,10)
      1 /0.0,
      2 0.0,
      3 2.50E-10,
      4 1.88E-08,
180      5 2.50E-10,
      6 5.75E-09,
      7 4*0.0/
      DATA(TAW(12,M),M=1,10)/10*0.0/
C
C *** SMTP LEAKAGE (LEAKS) ***
185 C AREA = 1.215E5 SQ INCHES
      DATA(RTE(13,M),M=1,10)
      1 /0.0,
      2 0.0,
      3 3.99E-10,
190      4 2.99E-08,
      5 3.99E-10,
      6 9.18E-09,
      7 4*0.0/
      DATA(TAW(13,M),M=1,10)/10*0.0/
195 C
C *** PAYLOAD BAY LINER INSIDE VENTS (FILI) ***
C DATA(RTE(14,M),M=1,10)
      1 /0.0,
      2 0.0,
200      3 1.36E-8,
      4 1.02E-6,
      5 1.36E-8,
      6 3.43E-7,
      7 4*0.0/
205 DATA(TAW(14,M),M=1,10)/10*0.0/
C
C *** PAYLOAD BAY LINER OVERBOARD VENTS (FILO) ***
C DATA(RTE(15,M),M=1,10)
      1 /0.0,
210      2 0.0,
      3 3.55E-09,
      4 2.67E-07,
      5 3.55E-09,
      6 8.15E-08,
215      7 4*0.0/
      DATA(TAW(15,M),M=1,10)/10*0.0/
C
C THE FOLLOWING IS USED TO PLACATE THE CDC LOADER
C
220 C DO 10 M=1,10
      DO 5 K=1,15
      RATE(K,M) = RTE(K,M)
      5 TAU(K,M) = TAW(K,M)
      10 CONTINUE
225 C
C *****
C * * MATERIALS LIST * *
C KINDS=15

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Figure B-2 continued
B-14

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	DATA(KKIND(K),K=1,15)	BLCKC	233
230	1 /6H LINER,	BLCKC	234
	2 6HTEFLON,	BLCKC	235
	3 6H NOMEX,	BLCKC	236
	4 6H LRSI,	BLCKC	237
	5 6H HRSI,	BLCKC	238
235	6 6H RCC,	BLCKC	239
	7 6HBLKHED,	BLCKC	240
	8 6HWINDOW,	BLCKC	241
	9 6H MTCS,	BLCKC	242
	* 6H PTCS,	BLCKC	243
240	1 6HCRACKS,	BLCKC	244
	2 6H LEAKL,	BLCKC	245
	3 6H LEAKS,	BLCKC	246
	4 6H FILI,	BLCKC	247
	5 6H FILO/	BLCKC	248
245	C DO 20 K=1,15	BLCKC	249
	20 KIND(K)=KKIND(K)	BLCKC	250
	C *****	BLCKC	251
	C *****	BLCKC	252
250	C * * LIST OF SPECIES,MOLECULAR WEIGHTS AND DIAMETERS(CENTIMETERS) * *	BLCKC	253
	C * * THAT WILL BE USED TO COMPUTE COLLISION CROSS SECTIONS * *	BLCKC	254
	C * * REFERENCE HIRSCHFELDER,CURTISS AND BIRD	BLCKC	255
	C * *	BLCKC	256
	DATA(SDATA(K),K=1,30)	BLCKC	257
255	1 /6H OUTG1, 100., 7.800E-8,	BLCKC	258
	2 6H OUTG2, 100., 7.800E-8,	BLCKC	259
	3 6H H2O, 18., 3.245E-8,	BLCKC	260
	4 6H N2, 28., 4.132E-8,	BLCKC	261
	5 6H CO2, 44., 4.485E-8,	BLCKC	262
260	6 6H O2, 32., 3.853E-8,	BLCKC	263
	7 6H CO, 28., 4.029E-8,	BLCKC	264
	8 6H H2, 2., 3.331E-8,	BLCKC	265
	9 6H H, 1., 2.640E-8,	BLCKC	266
	* 6HMMHNO3, 46., 4.500E-8/	BLCKC	267
265	C	BLCKC	268
	KK=0	BLCKC	269
	DO 30 K=1,28,3	BLCKC	270
	KK=KK+1	BLCKC	271
	SPECIE(KK) = SDATA(K)	BLCKC	272
270	MOLWT(KK) = SDATA(K+1)	BLCKC	273
	30 DIA(KK) = SDATA(K+2)	BLCKC	274
	C *****	BLCKC	275
	C * * LIST OF SURFACE LOCATIONS * *	BLCKC	276
	DATA(PLCE(K),K=1,10)	BLCKC	277
275	1 /6H BAY,	BLCKC	278
	2 6H CREW,	BLCKC	279
	3 6HFUSLAG,	BLCKC	280
	4 6H GMS,	BLCKC	281
	5 6HRADOOR,	BLCKC	282
280	6 6H TAIL,	BLCKC	283
	7 6H WING,	BLCKC	284
	8 6HMODULE,	BLCKC	285
	9 6H PLT1,	BLCKC	286
	* 6H PLT2/	BLCKC	287
285	DATA(PLCE(K),K=11,20)	BLCKC	288
		BLCKC	289

B-15
Figure B-2 continued

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290      1 /6H PLT3,
      2 6H PLT4,
      3 6H PLT5,
      4 6H WINDO%,
      5 6H ELEVO%,
      6 6H BAYL,
      7 6H MODL,
      8 6H WINDL,
295      9 6H FILTER,
      * 6H NONE/

C
      DO 40 I=1,20
      40 PLACE(I)=PLCE(I)
C
300 C*****
C LOAD IN THE SPECIES MASS FRACTIONS TO BE USED FOR THE
C SHUTTLE ENGINES AND EVAPORATOR
C
      DATA(SPDATA(K),K=1,50)
305 C TYPE OUT1 OUT2 H2O N2 CO2 O2 CO H2 H MMH HNO3
      1 /0.0, 0.0, .290, .420, .078, .001, .184, .017, .001, .002,
      2 0.0, 0.0, .290, .420, .078, .001, .184, .017, .001, .002,
      3 0.0, 0.0, .290, .420, .078, .001, .184, .017, .001, .002,
      4 0.0, 0.0, 1.000, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
310      5 0.0, 0.0, 1.000, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0/
      DO 60 K=1,5
      DO 50 L=1,10
      50 SPECMF(L,K)=SPDATA( (K-1)*10+L )
      60 CONTINUE
315 C
C LOAD IN THE PLUME FUNCTION COEFFICIENTS
C
      DATA(PFDATA(K),K=1,50)
320 C C1 C2 C3 THETA1 C5 C6 THETA2 MFLUX VELOC TYPE
      1 /1351.,10.00,.0126,64.0, 35.0,-.0350,180., 0.,3.5E+5,6H RCS,
      2 23.2, 8.65,.0137,40.0,5.810,-.0467,140.,.054,3.5E+5,6H VCS,
      3 9332.,10.65,.0126,64.0,235.5,-.0350,180., 0.,3.5E+5,6H OMS,
      4 4.47, 6.00,.0176,36.8, 1.14,-.0773,148.,.002,1.0E+5,6H EVAP2,
325      5 1.963, 6.00,.0106,148., 0., 0.,148., 0.,1.0E+5,6H EVAP1/
C
      DATA(NPLME(K),K=1,5)
C TYPES OF ENGINES/VENTS
330      1 / 6H RCS,
      2 6H VCS,
      3 6H OMS,
      4 6H EVAP2,
      5 6H EVAP1/
C
335      DO 80 K=1,5
      DO 70 L=1,10
      70 PLUMEC(L,K) = PFDATA( (K-1) * 10 + L )
      80 CONTINUE
      DO 90 K=1,5
340      90 NPLUME(K) = NPLME(K)
      RETURN
      END

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1      SUBROUTINE MLOSSR(J)
C
C      *****
C      *          SPECIES MASS LOSS RATE          *
C      *          *****
C      CODED BY: M. HETRICK 2/16/77
C
C      OBJECTIVE:
C      THE OBJECTIVE OF THIS FUNCTION IS TO ASSIGN THE RATE AT WHICH
C      SPECIES M IS LEAVING THE SURFACES. THERE ARE 10 SPECIES CURRENTLY
C      BEING MONITORED ALTHOUGH ONLY SIX (M=1,6) ARE LOST AS ORIGINAL
C      MATERIAL FROM SURFACES. THE FOLLOWING TABLE LISTS MASS FRACTIONS
C      OF THE VARIOUS SPECIES DURING CERTAIN ON-ORBIT EVENTS. MOLE
C      FRACTION ARE GIVEN IN PARENTHESES.
C
C      SPECIE,M      EARLY      OUTGAS      ENG      EVAP      LEAKAGE
C                   DESORP     PERIOD     FIRINGS   OPERATION
C                   PERIOD
C      1- OUTGAS1      1.0
C      2- OUTGAS2      X
C      3- H2O          .420(.570)      .290(.328)  1.0      .010(.016)
C      4- N2           .262(.229)      .420(.306)      .750(.760)
C      5- CO2          .212(.118)      .078(.036)      .010(.007)
C      6- O2           .100(.076)      .001(.001)      .230(.219)
C      7- CO           .184(.134)
C      8- H2           .017(.017)
C      9- ENG1(H)      .001(.015)
C      10- ENG2(MMHNO3) .002(.001)
C
C      TESTING HAS SHOWN THAT THE H2O,CO2,N2,AND O2 ARE DESORBED FROM A
C      SURFACE WITHIN 10 TO 20 HOURS AFTER INSERTION INTO VACUUM(ORBIT)
C      THESE GASES ARE REABSORBED UPON RE-ENTRY SO THEIR MASS LOSS RATES
C      ARE NOT A FUNCTION OF THE AGE OF THE SURFACE. HOWEVER SPECIES THAT
C      ARE UNIQUE TO THE MANUFACTURING PROCESS SUCH AS LARGE MOLECULAR
C      WEIGHT OILS DO HAVE MASS LOSS RATES THAT ARE A FUNCTION OF LONG TERM
C      SURFACE HISTORY. GENERALLY THESE OILS HAVE A LOW CONCENTRATION ON
C      THE GROUND AND THERE IS NO SIGNIFICANT REABSORPTION.
C
C      COMMON/CMLOSS/MLR(300,10),MDOT(300)
C      COMMON/CNTRL/DEPSIT,DBUGA,DBUGB,DBUGC,DBUGD,ED,ENG,
C      1      EVAP,FIVP,LEAK,LMCP,MAXTMP,MCD,
C      2      MFPATH,NEWCON,NEWTNL,NEWMPF,NEWWFS,NEWMLC,NEWTCD,
C      3      MINTMP,ORBITR,OUT,REFLECT,REPORT(50),
C      4      RFAS,RFSS,SMTP,TITLE(12),TSTART(3),
C      5      TSTCP(3),GO,SUNL,SUNM,SUNH
C      COMMON/MDF/ATCODE,TIME(6),RFSURF(10),RECEVR(50),
C      2      BETA,PITCH,YAW,ROLL,ALT,RMAXL,
C      3      DSMCD(25),PHIL(25),THETA1(25),XLOS(25),YLCS(25),
C      4      ZLOS(25),COSXX(10),COSXY(10),COSXZ(10),COSYX(10),
C      5      COSYY(10),COSYZ(10),COSZX(10),COSZY(10),COSZZ(10),
C      6      DPHI(10),DOMEGA(10),DTHETA(10),
C      7      PHI1(10),PHI2(10),THETA1(10),THETA2(10),VX,VY,VZ,
C      8      XO(10),YO(10),ZO(10),DSRTNF(25),RMAXRF
C      COMMON/SURF/IDENT(300),SECT(300),MATRL(300),AREA(300)
C      COMMON/SOURCE/SURFSC(300),PNTSC(50),ONTIME(50),SSURFS(300)
C      COMMON/TMP/TEMPOS(300),TEMPOR(50)

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Figure B-3 MLOSSR Changes

B-17

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	COMMON,RATES1/RATE(15,10),TAU(15,10)	MLOSSR	62
	COMMON,RATES2/AGEORB, AGESLB, KIND(15), SPECIE(10),MOLWT(10),	MLOSSR	63
60	1 PLACE(20),DIA(10)	MLOSSR	64
	COMMON/SEGA/JTOTAL,JKEEP,KINDS,KTOTAL	MLOSSR	65
	COMMON/SPEC/MOUT1,MOUT2,MED1,MED2,M1,M2	MLOSSR	66
	DIMENSION T(10),TCDEF(10)	MLOSSR	67
	REAL MLR	MLOSSR	68
65	INTEGER SSURFS,SURFSC	MLOSSR	69
	LOGICAL DBUGA,ED,OUT	MLOSSR	70
	C	MLOSSR	71
	C	MLOSSR	72
	C	MLOSSR	73
70	C THE AGE OF THE ORBITER AND SPACELAB SURFACES IS SPECIFIED AS AGEORB	MLOSSR	74
	C AND AGESLB,	MLOSSR	75
	C	MLOSSR	76
	AGE = AGEORB	MLOSSR	77
	IF(SURFSC(J).GT.1000)AGE=AGESLB	MLOSSR	78
75	C	MLOSSR	79
	C IN GENERAL THE TIME USED FOR LOSS OF THE LOW MOLECULAR WEIGHT GASES	MLOSSR	80
	C IS THE TIME FROM LAUNCH MINUS 3 MINUTES(TIME TO REACH C.10 ⁻³ TORR)	MLOSSR	81
	C WHEREAS THE TIME USED FOR THE LARGE MOLECULAR WEIGHT SPECIES(M=1&2)	MLOSSR	82
	C IS FIGURED USING THE AGE OF THE SURFACE PLUS TIME ON ORBIT	MLOSSR	83
90	C	MLOSSR	84
	TIMEOO=TSTART(1)*60.+ TSTART(2) + TSTART(3)/60. - 3.	MLOSSR	85
	C	MLOSSR	86
	IF(TIMEOO.LT.0.) CALL ERRORB(1,0)	MLOSSR	87
	T(1)=TIMEOO + AGE	MLOSSR	88
85	T(2)=TIMEOO + AGE	MLOSSR	89
	T(3)=TIMEOO	MLOSSR	90
	T(4)=TIMEOO	MLOSSR	91
	T(5)=TIMEOO	MLOSSR	92
	T(6)=TIMEOO	MLOSSR	93
90	T(7)=TIMEOO	MLOSSR	94
	T(8)=TIMEOO	MLOSSR	95
	T(9)=TIMEOO	MLOSSR	96
	T(10)=TIMEOO	MLOSSR	97
	C	MLOSSR	98
95	C THE CURRENT TEMPERATURE OF SURFACE SURFSC(J) IS TEMPOS(J)	MLOSSR	99
	C	MLOSSR	100
	TJ = TEMPOS(J)	MLOSSR	101
	CL,1100,1300	MLOSSR	102
100	C DEFINE THE MATERIAL AND COMPUTE THE MASS LOSS RATE OF EACH SPECIES	MLOSSR	103
	C	MLOSSR	104
	C THE SECTION OF THE CONFIGURATION IN WHICH NJ CAN BE FOUND IS SECT(J)	MLOSSR	105
	C THE KIND OF SURFACE IS MATRL(J)	MLOSSR	106
	DO 30 K=1,KINDS	MLOSSR	107
	IF(MATRL(J).EQ. KIND(K)) GO TO 40	MLOSSR	108
105	30 CONTINUE	MLOSSR	109
	CALL ERRORB(2,MATRL(J))	MLOSSR	110
	40 CONTINUE	MLOSSR	111
	IKIND=K	MLOSSR	112
	C	MLOSSR	113
110	IF(DBUGA) WRITE(8,6100)IKIND,SURFSC(J),J	MLOSSR	114
	GO TO (100,200,300,400,500,600,700,800,900,1000,1100,1200,1300,	MLOSSR	115
	1400,1500),IKIND	MLOSSR	116
	C	MLOSSR	117
	C *** MATERIAL IS PAYLOAD LINER ***	MLOSSR	118

Figure B-3 continued

B-18

115	100 CONTINUE	MLOSSR 119
	DO 101 M=M1,M2	MLOSSR 120
	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR 121
	MLR(J,M)= RATE(1,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(1,M)*60.))	MLOSSR 122
120	101 CONTINUE	MLOSSR 123
	RETURN	MLOSSR 124
	C	MLOSSR 125
	C *** MATERIAL IS TEFLON ***	MLOSSR 126
	200 CONTINUE	MLOSSR 127
	DO 201 M=M1,M2	MLOSSR 128
125	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR 129
	MLR(J,M)= RATE(2,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(2,M)*60.))	MLOSSR 130
	201 CONTINUE	MLOSSR 131
	RETURN	MLOSSR 132
	C	MLOSSR 133
130	C *** MATERIAL IS NOMEX ***	MLOSSR 134
	300 CONTINUE	MLOSSR 135
	DO 301 M=M1,M2	MLOSSR 136
	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR 137
	MLR(J,M)= RATE(3,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(3,M)*60.))	MLOSSR 138
135	301 CONTINUE	MLOSSR 139
	RETURN	MLOSSR 140
	C	MLOSSR 141
	C *** MATERIAL IS LRSI ***	MLOSSR 142
	400 CONTINUE	MLOSSR 143
140	DO 401 M=M1,M2	MLOSSR 144
	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR 145
	MLR(J,M)= RATE(4,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(4,M)*60.))	MLOSSR 146
	401 CONTINUE	MLOSSR 147
	RETURN	MLOSSR 148
145	C	MLOSSR 149
	C *** MATERIAL IS HRSI ***	MLOSSR 150
	500 CONTINUE	MLOSSR 151
	DO 501 M=M1,M2	MLOSSR 152
	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR 153
150	MLR(J,M)= RATE(5,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(5,M)*60.))	MLOSSR 154
	501 CONTINUE	MLOSSR 155
	RETURN	MLOSSR 156
	C	MLOSSR 157
	C *** MATERIAL IS RCC ***	MLOSSR 158
155	600 CONTINUE	MLOSSR 159
	DO 601 M=M1,M2	MLOSSR 160
	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR 161
	MLR(J,M)= RATE(6,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(6,M)*60.))	MLOSSR 162
	601 CONTINUE	MLOSSR 163
160	RETURN	MLOSSR 164
	C	MLOSSR 165
	C *** MATERIAL IS THE BULKHEAD ***	MLOSSR 166
	700 CONTINUE	MLOSSR 167
	DO 701 M=M1,M2	MLOSSR 168
165	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR 169
	MLR(J,M)= RATE(7,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(7,M)*60.))	MLOSSR 170
	701 CONTINUE	MLOSSR 171
	RETURN	MLOSSR 172
	C	MLOSSR 173
170	C *** MATERIAL IS A SURFACE THAT LEAKS CABIN ATMOSPHERE ***	MLOSSR 174
	1100 CONTINUE	MLOSSR 175

Figure B-3 continued
B-19ORIGINAL PAGE IS
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	DO 1101 M=M1,M2	MLOSSR	176
	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR	177
	MLR(J,M)= RATE(11,M)	MLOSSR	178
175	1101 CONTINUE	MLOSSR	179
	RETURN	MLOSSR	180
	C	MLOSSR	181
	C *** MATERIAL IS MTSC ***	MLOSSR	182
	900 CONTINUE	MLOSSR	183
180	IF(.NOT.CUT) GO TO 903	MLOSSR	184
	DO 901 M=MCUT1,MCUT2	MLOSSR	185
	TCOEF(M) = (TJ-125.)/11.	MLOSSR	186
	MLR(J,M)= RATE(9,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(9,M)*60.))	MLOSSR	187
	901 CONTINUE	MLOSSR	188
185	903 IF(.NOT.ED) RETURN	MLOSSR	189
	E = 7500.	MLOSSR	190
	R = 1.93	MLOSSR	191
	TJK = TJ + 273.	MLOSSR	192
	DO 902 M = MED1,MED2	MLOSSR	193
190	TCOEF(M) = (E/R)*(1./373. - 1./TJK)	MLOSSR	194
	MLR(J,M)= RATE(9,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(9,M)*60.))	MLOSSR	195
	902 CONTINUE	MLOSSR	196
	RETURN	MLOSSR	197
	C	MLOSSR	198
195	C	MLOSSR	199
	C *** MATERIAL IS PTSC ***	MLOSSR	200
	1000 CONTINUE	MLOSSR	201
	IF(.NOT.CUT) GO TO 1003	MLOSSR	202
	DO 1001 M=MCUT1,MCUT2	MLOSSR	203
200	TCOEF(M) = (TJ-125.)/20.	MLOSSR	204
	MLR(J,M)= RATE(10,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(10,M)*60.))	MLOSSR	205
	1001 CONTINUE	MLOSSR	206
	1003 IF(.NOT.ED) RETURN	MLOSSR	207
205	E = 7500.	MLOSSR	208
	R = 1.98	MLOSSR	209
	TJK = TJ + 273.	MLOSSR	210
	DO 1002 M = MED1,MED2	MLOSSR	211
	TCOEF(M) = (E/R)*(1./373. - 1./TJK)	MLOSSR	212
	MLR(J,M)= RATE(10,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(10,M)*60.))	MLOSSR	213
210	1002 CONTINUE	MLOSSR	214
	RETURN	MLOSSR	215
	C	MLOSSR	216
	C *** MATERIAL IS WINDCA ***	MLOSSR	217
	800 CONTINUE	MLOSSR	218
215	DO 801 M=M1,M2	MLOSSR	219
	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR	220
	MLR(J,M)= RATE(8,M) * EXP(TCOEF(M)) * EXP(T(M)/(-TAU(8,M)*60.))	MLOSSR	221
	801 CONTINUE	MLOSSR	222
220	RETURN	MLOSSR	223
	C	MLOSSR	224
	C *** MATERIAL IS LMOP CABIN LEAKS ***	MLOSSR	225
	1200 CONTINUE	MLOSSR	226
	DO 1201 M=M1,M2	MLOSSR	227
	TCOEF(M)=(TJ - 100.) / 29.	MLOSSR	228
225	MLR(J,M)= RATE(12,M)	MLOSSR	229
	1201 CONTINUE	MLOSSR	230
	RETURN	MLOSSR	231
	C	MLOSSR	232

Figure B-3 continued

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230      C *** MATERIAL IS SMTP CABIN LEAKS ***
        1300 CONTINUE
              DO 1301 M=M1,M2
                TCDEF(M)=(TU - 100.) / 29.
                MLR(J,M)= RATE(13,M)
        1301 CONTINUE
        235      RETURN
      C
      C *** MATERIAL IS FILI ***
        1400 CONTINUE
              DO 1401 M=M1,M2
                MLR(J,M)= RATE(14,M)
        1401 CONTINUE
        240      RETURN
      C
      C *** MATERIAL IS FILD ***
        1500 CONTINUE
              DO 1501 M=M1,M2
                MLR(J,M)= RATE(15,M)
        1501 CONTINUE
        245      RETURN
      C
        250      6100      FORMAT('  MLCSSR(100) IKIND,SURFSC(J),J',3I10)
              END

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MLOSSR 233
MLOSSR 234
MLOSSR 235
MLOSSR 236
MLOSSR 237
MLOSSR 238
MLOSSR 239
MLOSSR 240
MLOSSR 241
MLOSSR 242
MLOSSR 243
MLOSSR 244
MLOSSR 245
MLOSSR 246
MLOSSR 247
MLOSSR 248
MLOSSR 249
MLOSSR 250
MLOSSR 251
MLOSSR 252
MLOSSR 253
MLOSSR 254
MLOSSR 255
MLOSSR 256

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SYMBOLIC REFERENCE MAP (R=2)

ENTRY POINTS	DEF LINE	REFERENCES									
3 MLOSSR	1	120 128 203 211	136 219	144 227	152 235	160 242	168 249	176	185	193	
VARIABLES	SN	TYPE	RELOCATION								
702 AGE		REAL		REFS	84	85	DEFINED	73	74		
0 AGEORB		REAL	RATES2	REFS	59	73					
1 AGESLB		REAL	RATES2	REFS	59	74					
107 ALT		REAL	WDF	REFS	47						
1604 AREA		REAL	ARRAY SURF	REFS	55						
0 ATCODE		REAL	WDF	REFS	47						
103 BETA		REAL	WDF	REFS	47						
337 COSXX		REAL	ARRAY WDF	REFS	47						
351 COSXY		REAL	ARRAY WDF	REFS	47						
363 COSXZ		REAL	ARRAY WDF	REFS	47						
375 COSYX		REAL	ARRAY WDF	REFS	47						
407 COSYY		REAL	ARRAY WDF	REFS	47						
421 COSYZ		REAL	ARRAY WDF	REFS	47						
433 COSZX		REAL	ARRAY WDF	REFS	47						
445 COSZY		REAL	ARRAY WDF	REFS	47						
457 COSZZ		REAL	ARRAY WDF	REFS	47						
1 DBUGA		LOGICAL	CNTRL	REFS	41	66	110				
2 DBUGB		REAL	CNTRL	REFS	41						
3 DBUGC		REAL	CNTRL	REFS	41						
4 DBUGD		REAL	CNTRL	REFS	41						
0 ZEPSIT		REAL	CNTRL	REFS	41						

Figure B-3 concluded

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ORIGINAL PAGE IS
OF POOR QUALITY